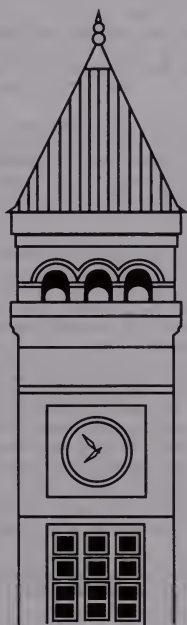


CLEMSON

UNDERGRADUATE
96⁹⁷ ANNOUNCEMENTS



Clemson University
Undergraduate Announcements
1996-97



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PURPOSE OF CATALOG

The purpose of this catalog is to give a general description of Clemson University and to provide prospective students with detailed information regarding the various colleges and departments within the University and curricula offered by the University. Inasmuch as the educational process necessitates change, the information and educational requirements in this catalog represent a flexible program which may be altered where such alterations are thought to be in the mutual interest of the University and its students.

The provisions of this catalog do not constitute a contract which may be accepted by students through registration and enrollment in the University. The University reserves the right to change without notice any fee, provision, offering or requirement in this catalog and to determine whether a student has satisfactorily met its requirements for admission or graduation. The University further reserves the right to require a student to withdraw from the University for cause at any time.

Each curriculum shall be governed by the requirements in effect on the date of enrollment. If a student withdraws from the University and subsequently returns or does not remain continuously enrolled (summers excluded), the requirements in effect at the time of return will normally prevail.

STUDENT RESPONSIBILITY

All colleges and departments establish certain academic requirements that must be met before a degree is granted. Advisors, department chairs and deans are available to help the student understand and meet these requirements, but the student is responsible for fulfilling them. If, at the end of a student's course of study, the requirements for graduation have not been satisfied, the degree will not be granted. For this reason, it is important for students to acquaint themselves with all academic requirements throughout their college careers and to be responsible for completing all requirements within prescribed deadlines and time limits.

CLEMSON UNIVERSITY IS AN EQUAL OPPORTUNITY EMPLOYER WITH AN AFFIRMATIVE ACTION PLAN

Clemson University, in compliance with Titles VI and VII of the Civil Rights Act of 1964, as amended, Title IX of the Education Amendments of 1972, and Sections 503 and 504 of the Rehabilitation Act of 1973, does not discriminate on the basis of race, color, national origin, religion, sex, or disability in any of its policies, procedures, or practices; nor does the University, in compliance with the Age Discrimination in Employment Act of 1967, as amended, and Section 402 of the Vietnam Era Veterans Readjustment Act of 1974, discriminate against any employees or applicants for employment on the basis of their age or because they are disabled veterans or veterans of the Vietnam Era. Clemson University conducts its programs and activities involving admission, access, treatment, employment, teaching, research, and public service in a nondiscriminatory manner as prescribed by Federal laws and regulations.

In conformance with University policy and pursuant to Executive Order 11246, as amended, Section 503 of the Rehabilitation Act of 1973, and Section 402 of the Vietnam Era Veterans Readjustment Act of 1974, Clemson University is an Affirmative Action/Equal Opportunity Employer.

Inquiries concerning the above may be addressed to the following: President, Clemson University, Clemson, South Carolina 29634; Director, Office for Human Resources, E-103 Martin Hall, Clemson University, Clemson, South Carolina 29634; Director, Office for Civil Rights, Department of Education, Washington, D.C. 20201.

PATENTS AND COPYRIGHTS

All students enrolling in Clemson University do so with full understanding that

1. The University has full ownership rights in any inventions, discoveries, developments and/or improvements, whether or not patentable (inventions), which are conceived, developed or reduced to practice, or caused to be conceived, developed or reduced to practice, by undergraduate students during the course of their academic activities conducted as part of any undergraduate curriculum. Any such invention will be handled by the University in the same manner as set forth in the *Faculty Manual of Clemson University*, the pertinent provision for which appears as Part VI E entitled "Patent Policy."

2. Copyright ownership of any research work will be determined by University policy and by policies of organizations responsible for publishing or distributing copyrighted material.

Copies of the policies on patents and copyrights are available in the individual departments and colleges and in the Special Projects Office.

ENGLISH FLUENCY

Clemson University has established a policy to assure that all instructional activities are conducted by individuals possessing appropriate proficiency in written and oral use of the English language. Instructional activities include lectures, recitation or discussion sessions, and laboratories. The individuals to be certified include full-time and part-time faculty, graduate teachers of record, graduate teaching assistants and graduate laboratory assistants for whom English is not the first language.

A student who experiences difficulty with an instructor's written or oral English and who wishes to seek relief must do so prior to the seventh meeting of a 50-minute class and prior to the fifth meeting of a 90-minute class in regular semesters. In the five-week summer sessions, relief must be sought prior to the third class meeting.

The procedure is summarized as follows:

- The student must quickly bring the problem to the attention of the instructor's department chair either directly or through a faculty member such as the student's advisor. That department chair will assess the complaint and, if deemed valid, offer an appropriate remedy within two days.
- A student who is not satisfied with the department chair's decision or the relief suggested, may appeal within two days to a five-member hearing panel comprised of three faculty members and two students appointed by the Senior Vice Provost and Dean of Undergraduate Studies.

Students with questions about any of the above should contact the Director of Undergraduate Academic Services, 101 Sikes Hall.

FAMILY EDUCATIONAL RIGHTS AND PRIVACY ACT (Annual Notice to Students)

Clemson University annually informs students of the Family Educational Rights and Privacy Act of 1974. This act, with which the institution intends to comply fully, was enacted by Congress to protect the privacy of education records, to establish the right of students to inspect and review their education records, and to provide guidelines for the correction of inaccurate or misleading data through informal and formal hearings. Students also have the right to file complaints with the Family Educational Rights and Privacy Act Office (FERPA) in Washington, D.C., concerning alleged failures by the University to comply with the act.

A detailed policy statement containing the procedures to be used in complying with the provisions of the act can be found in the Office of the Vice President for Student Affairs. The policy statement lists all education records maintained on students by the University.

Questions concerning the Family Educational Rights and Privacy Act may be referred to the President's Office, 201 Sikes Hall.

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ACADEMIC CALENDAR

Maymester 1996

May 13, M	Late registration and first day of class
May 14, Tu	Last day to register
May 16, Th	Last day to drop a class or withdraw from the University without a W grade
May 18, S	Classes meet
May 22, W	Last day to drop a class or withdraw from the University without final grades
May 25, S	Classes meet
May 28, Tu	Examinations

First Summer Session 1996

May 20, M	Late registration
May 21, Tu	Classes begin; late enrollment fee applies
May 22, W	Last day to register or add a class
May 29, W	Last day to drop a class or withdraw from the University without a W grade
June 10, M	Last day to order diploma for August graduation
June 12, W	Last day to drop a class or withdraw from the University without final grades
June 25, Tu	Examinations

Second Summer Session 1996

July 1-2, M-Tu	Orientation
July 2, Tu	Late registration
July 3, W	Classes begin; late enrollment fee applies
July 4, Th	Holiday
July 5, F	Last day to register or add a class
July 6, S	Classes meet
July 11, Th	Last day to drop a class or withdraw from the University without a W grade
July 25, Th	Last day to drop a class or withdraw from the University without final grades
August 7, W	Examinations
August 10, S	Graduation

Fall Semester 1996

August 18-19, S-M	Orientation
August 20-21, Tu-W	Late registration
August 22, Th	Classes begin; late enrollment fee applies
August 28, W	Last day to register or add a class
September 11, W	Last day to order diploma for December graduation
September 18, W	Last day to drop a class or withdraw from the University without a W grade
October 30, W	Last day to drop a class or withdraw from the University without final grades
November 4-5, M-Tu	Fall break
November 6, W	Registration for spring, Maymester and summer terms begins
November 28-29, Th-F	Thanksgiving holiday
December 4-5, W-Th	Classes meet; exams permitted in labs only
December 6, F	Reading Day (no classes; lab exams only)
December 9-14, M-S	Examinations*
December 19, Th	Graduation*

Spring Semester 1997

January 5-6, S-M	Orientation
January 6-7, M-Tu	Late registration
January 8, W	Classes begin; late enrollment fee applies
January 14, Tu	Last day to register or add a class
January 28, Tu	Last day to order diploma for May commencement
February 4, Tu	Last day to drop a class or withdraw from the University without a W grade
March 14, F	Last day to drop a class or withdraw from the University without final grades
March 17-21, M-F	Spring break
April 5-12, S-S	Honors and Awards Week
April 7, M	Registration for fall semester begins
April 23-24, W-Th	Classes meet; exams permitted in labs only
April 25, F	Reading Day (no classes; lab exams only)
April 28-May 3, M-S	Examinations*
May 9, F	Graduation*

Maymester 1997

May 12, M	Late registration and first day of class
May 13, Tu	Last day to register
May 15, Th	Last day to drop a class or withdraw from the University without a W grade
May 17, S	Classes meet
May 21, W	Last day to drop a class or withdraw from the University without final grades
May 24, S	Classes meet
May 27, Tu	Examinations

First Summer Session 1997

May 19, M	Late registration
May 20, Tu	Classes begin; late enrollment fee applies
May 21, W	Last day to register or add a class
May 28, W	Last day to drop a class or withdraw from the University without a W grade
June 9, M	Last day to order diploma for August graduation
June 11, W	Last day to drop a class or withdraw from the University without final grades
June 24, Tu	Examinations

Second Summer Session 1997

June 30-July 1, M-Tu	Orientation
July 1, Tu	Late registration
July 2, W	Classes begin; late enrollment fee applies
July 3, Th	Last day to register or add a class
July 4, F	Holiday
July 11, F	Last day to drop a class or withdraw from the University without a W grade
July 12, S	Classes meet
July 24, Th	Last day to drop a class or withdraw from the University without final grade
August 6, W	Examinations
August 9, S	Graduation

Fall Semester 1997

August 17-18, S-M	Orientation
August 19-20, Tu-W	Late registration
August 21, Th	Classes begin; late enrollment fee applies
August 27, W	Last day to register or add a class
September 10, W	Last day to order diploma for December graduation
September 17, W	Last day to drop a class or withdraw from the University without a W grade
October 20-21, M-Tu	Fall break
October 29, W	Last day to drop a class or withdraw from the University without final grades
November 3, M	Registration for spring, Maymester and summer terms begins
November 27-28, Th-F	Thanksgiving holiday
December 3-4, W-Th	Classes meet; exams permitted in labs only
December 5, F	Reading Day (no classes; lab exams only)
December 8-13, M-S	Examinations*
December 18, Th	Graduation*

Spring Semester 1998

January 4-5, S-M	Orientation
January 5-6, M-Tu	Late registration
January 7, W	Classes begin; late enrollment fee applies
January 13, Tu	Last day to register or add a class
January 27, Tu	Last day to order diploma for May commencement
February 3, Tu	Last day to drop a class or withdraw from the University without a W grade
March 13, F	Last day to drop a class or withdraw from the University without final grades
March 16-20, M-F	Spring break
April 4-11, S-S	Honors and Awards Week
April 6, M	Registration for fall semester begins
April 22-23, W-Th	Classes meet; exams permitted in labs only
April 24, F	Reading Day (no classes; lab exams only)
April 27-May 2, M-S	Examinations*
May 8, F	Graduation*

*A University-appointed committee is studying the number of days between final examinations and graduation for possible changes. Dates were still under review at press time.

Note: Dates on this calendar were accurate at the time of printing. Dates, however, may change as conditions warrant.

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GENERAL INFORMATION

HISTORY

When one man of wisdom and foresight can look among the despair of troubled times and imagine what would be, great things can happen. That is what the University's founder, Thomas Green Clemson, was able to do in the post-Civil War days. He looked upon a South that lay in economic ruin, once remarking that "conditions are wretched in the extreme" and that "people are quitting the land." Still, among the ashes he saw hope. Mr. Clemson envisioned what could be possible if the South's youth were given an opportunity to receive instruction in scientific agriculture and the mechanical arts. He once wrote, "The only hope we have for the advancement of agriculture (in the U.S.) is through the sciences, and yet there is not one single institution on this continent where a proper scientific education can be obtained." When he was president of the Pendleton Farmers Society in 1866, Mr. Clemson served on a committee whose purpose was to promote the idea of founding an institution for "educating the people in the sciences" and "which will in time secure permanent prosperity."

When he died on April 6, 1888, a series of events began that marked the start of a new era in higher education in the state of South Carolina, especially in the study of science, agriculture, and engineering. Mr. Clemson's passing set the stage for the founding of the university that bears his name—the beginning of a true "people's university," which opened the doors of higher education to all South Carolinians, rich and poor alike. In his will, Mr. Clemson bequeathed the Fort Hill plantation and a considerable sum from his personal assets for the establishment of an educational institution of the kind he envisioned. He left a cash endowment of approximately \$80,000 as well as the 814-acre Fort Hill estate to South Carolina for such a college. The biggest obstacle in the creation of an agricultural college—the initial expense—was removed by Mr. Clemson's bequest.

In November 1889, Governor Richardson signed the bill accepting Thomas Clemson's gift. Soon after a measure was introduced to establish the Clemson Agricultural College, with its trustees becoming custodians of Morrill Act and Hatch Act funds made available for agricultural education and research by federal legislative acts. The founding of Clemson Agricultural College supplanted the South Carolina College of Agriculture and Mechanics, which had opened in Columbia in 1880.

Today, more than a century later, the University is much more than its founder ever could have imagined. With its diverse learning and research facilities, the University provides an educational opportunity not only for the people of the State, as Mr. Clemson dreamed, but for thousands of young men and women throughout the country and the world.

Thomas Green Clemson came to the foothills of South Carolina when he married Anna Maria Calhoun, daughter of South Carolina's famous statesman John C. Calhoun.

Born in Philadelphia, Mr. Clemson was educated at schools both in the United States and France, where he attended lectures at the Royal School of Mines, studied with prominent scientists in the private laboratories of the Sorbonne Royal College of France, and received his diploma as an assayer from the Royal Mint in Paris. Mr. Clemson, then in his mid-20s, returned to America greatly influenced by his European studies. He became a great advocate of the natural sciences, achieving a considerable reputation as a mining engineer and a theorist in agricultural chemistry. He also was a gifted writer whose articles were published in the leading scientific journals of his day, an artist and a diplomat who represented the U.S. government as chargé d'affaires to Belgium for almost seven years.

Mr. Clemson had a lifelong interest in farming and agricultural affairs. He served as the nation's first superintendent of agricultural affairs (predecessor to the present secretary of agriculture position) and actively promoted the establishment and endowment of the Maryland Agricultural College in the 1850s. Although he is remembered today for these accomplishments, Thomas Clemson made his greatest historical contribution when, as a champion of formal scientific education, his life became intertwined with the destiny of educational and economic development in South Carolina. Although he never lived to see it, his dedicated efforts culminated in the founding of Clemson Agricultural College.

At the time of his death, Mr. Clemson was living at the Fort Hill homestead, which today is a national historic landmark and provides a historic centerpiece for the Clemson University campus. He had inherited the house and plantation lands of his famous father-in-law, Senator Calhoun, upon the death of Mrs. Clemson in 1875.

Clemson College formally opened in July 1893, with an enrollment of 446. From the beginning, the college was an all-male military school. It remained this way until 1955, when the change was made to "civilian" status for students, and Clemson became a coeducational institution. In 1964, the college was renamed Clemson University as the state legislature formally recognized the school's expanded academic offerings and research pursuits.

The enrollment of Clemson has grown from 446 students at the opening of the University to 16,318 for the first semester 1995-96. Since the opening of the University, 70,200 students have been awarded Bachelor's degrees. During this same period, 426 Associate degrees, 18,192 Master's, 1579 Doctor of Philosophy, 63 Doctor of Education, and 233 Education Specialist degrees have been awarded, a total of 90,693 degrees.

On November 27, 1989, the University observed the 100th anniversary of the State's acceptance of the terms and conditions of Mr. Clemson's bequest.

THE CAMPUS

The 1400 acre University campus is sited on the former homestead of statesman John C. Calhoun. Nestled in the foothills of the Blue Ridge Mountains and adjacent to Lake Hartwell, the campus commands an excellent view of the mountains to the north and west, some of which attain an altitude of over 5000 feet above mean sea level.

The Southern Railway and U.S. Highways 76 and 123 provide easy access to the City of Clemson and to the University. Oconee County Airport is four miles from the library. Both Atlanta and Charlotte are two hours driving time away.

Campus architecture is a pleasing blend of traditional and modern facilities enhanced by a beautiful landscape of towering trees, grassy expanses, and flowering plants. Academic, administrative, and student service buildings on campus represent an insured value of \$627 million. Clemson University's real estate holdings include over 32,000 acres of forestry and agricultural lands throughout the state, the majority of which are dedicated to Clemson's research and public-service missions.

Fort Hill, the former home of John C. Calhoun inherited by Thomas Clemson, and the Hanover House are listed on the National Register of Historic Places and are open to the public. The campus also has two recognized Historic Districts.

The Strom Thurmond Institute houses the institute offices, Senator Thurmond's papers and memorabilia, and the special collections of the Cooper Library. The Institute is a part of an instructional and public-service district that includes the Brooks Center for the Performing Arts and the Madren Center for Continuing Education.

CLEMSON UNIVERSITY MISSION STATEMENT

Clemson University is the scientifically oriented institution of higher education established by the citizens of South Carolina to preserve, enhance, interpret, and disseminate the body of human knowledge. As a publicly assisted, comprehensive land-grant institution, Clemson serves the State, the nation as a whole, and the international community through teaching, research, and public service.

The original philosophy guiding the University's mission appeared in the enabling legislation of the Morrill Land Grant Act of 1862, the will of Thomas Green Clemson which calls for the establishment of a "high seminary of learning," and the Act of Acceptance by the General Assembly of the State of South Carolina. Subsequent broadening of the general mission occurred with the passage by Congress of the Hatch Act of 1887, the Smith-Lever Act of 1914, and National Sea Grant Act of 1966. Further refinements are elaborated in the South Carolina Master Plan for Higher Education set forth in 1979 by the South Carolina Commission on Higher Education and through the focus of the Second Century Plan initiated by the University in 1986.

To fulfill its historic, expanded, and evolving mission, Clemson offers undergraduate and graduate programs within five colleges and a graduate school to a diversified on-campus student body and to a variety of audiences through continuing education courses on and off campus. The institution's role within the State of South Carolina is fulfilled through its mandated thrusts in agriculture and natural resources, architecture, engineering, textiles, basic sciences and technologies, and through an expanded role which also addresses the State's cultural and economic needs through emphases in health sciences, business, education, and the liberal

arts. Clemson University's response to public service is dynamic and unique. It is reflected through the expertise of each of its colleges, the S. C. Experiment Station, the Clemson University Cooperative Extension Service, and numerous regulatory programs which provide technical assistance, continuing education, technology transfer, and extension activities commensurate with life in a changing world and a global society.

The fulfillment of Clemson's mission rests, in large measure, with its faculty, who, individually, collectively, and in cooperation with all University personnel gather, interpret, and disseminate knowledge; generate new knowledge independently and in conjunction with colleagues and students; stimulate creative thought and expression; foster speculative and critical thought; groom leaders; initiate progressive change; prepare students to cope with the world as it is, contribute to developing a better world, and appreciate the interconnectedness of modern life; and advance the common good by anticipating and devising new solutions for intellectual, scientific, social, and technical problems.

As stewards to taxpayers, alumni, donors, and students, Clemson University will husband its resources; engage in strategic planning; implement, direct, and review authorized programs, modifying goals and operations as deemed necessary; and assess student, faculty, and administrative performance regularly and in accordance with norms upheld by both the University's evaluative procedures and those of appropriate professional societies.

ACCREDITATION

Clemson University is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award the Bachelor's, Master's, Specialist, and Doctor's degrees. Curricula are accredited by Accreditation Board for Engineering and Technology, American Assembly of Collegiate Schools of Business, Computing Sciences Accreditation Board, Council on Accreditations of the National Recreation and Park Association, National Architectural Accrediting Board, National Association of State Directors of Teacher Education and Certification, National Council for Accreditation of Teacher Education, National League for Nursing, and Society of American Foresters. Documentation of accreditation may be reviewed in the college deans' offices.

LIBRARIES

Clemson's main library, the Cooper Library, is located at the center of campus and provides students with a variety of services and up-to-date collections. More than 1.6 million items are available in the form of books, periodicals, microforms, government publications, and other materials.

Access to the library's collections is provided through the Library User Information Service (LUIS), which is an online catalog. To assist in finding journal articles, the Document Online Retrieval Information Service (DORIS) is available to search a number of general and specialized indexes. Both LUIS and DORIS are accessible from most computers on campus as well as through dial access. Among the regular services the libraries offer are

circulation, reference, interlibrary loan, tours, and instruction. The library also provides photocopiers, computer terminals, and microcomputers, as well as a variety of other services. Assistance is available at the reference desk.

In addition to the Cooper Library, the University libraries include the Emery A. Gunnin Architectural Library and the Special Collections Unit located in the Strom Thurmond Institute building. The branch libraries contain material dealing with the special nature of their programs. A small reading room containing periodical literature for the Chemistry Department is located in Hunter Chemistry Laboratory. Hours of operation for the branch libraries may be obtained by calling individual libraries.

Detailed information regarding facilities, special hours of operation, loan privileges, policies, and fine regulations is available at the circulation and reference desks.

COMPUTING FACILITIES

The Clemson University Division of Computing and Information Technology (DCIT) supports student coursework, research, and administrative data processing requirements of the University using a sophisticated network of computers. These include an HDS AS/EX-90 mainframe computer, several VAX computers, and numerous microcomputers. Computer centers are maintained in the Poole Agricultural Center and in the Information Technology Center at the Clemson Research Park. Remote sites containing a variety of computers, terminals, and peripheral equipment are maintained in Brackett, Cooper Library, Daniel, Kinard, Lee, Lowry, McAdams, Martin, Poole, and Sirrine. Dial-up telephone numbers are available for local as well as national and international network access. Clemson is connected to the Internet, which provides access to the national super-computer centers as well as other network resources. DCIT performs research, development, and public-service projects through its Information Systems Development group. A complete list of facilities and services is available through the DCIT Web page. Additional information is available from the CTS Help Desk.

CALHOUN COLLEGE HONORS PROGRAM

Established in 1962, Calhoun College, the Honors Program of Clemson University, strives to enrich the educational experience of highly motivated, academically talented students by providing opportunities for scholarship and research not always available to undergraduates.

Participation in the program is by invitation to entering freshman with SAT scores of 1300 and above who rank within the top 10 percent of their high school graduating class. Enrolled students may join the program if they have earned a cumulative grade-point ratio of 3.4 or better as a full-time student at Clemson University, and have earned no more than 75 semester hours or have at least four semesters remaining to complete their degree program requirements. To continue membership in Calhoun College, students must maintain a cumulative grade-point ratio of 3.4 or higher and must complete one honors course each semester.

The honors curriculum consists of two components. To earn General Education Honors, students must demonstrate breadth by completing at least four honors courses totaling a minimum of 14 semester hours with no more than eight hours or two courses within that minimum in any one subject. Courses chosen are usually 100-200 level courses that satisfy General Education requirements.

Normally undertaken in the junior and senior years, Departmental Honors provides opportunities for honors students to do advanced, in-depth study and research within their major academic disciplines. Specific requirements are set by the department, but all students, regardless of major, are expected to complete a thesis, portfolio of creative works, major research project or similar capstone achievement.

Students completing both General Education Honors and Departmental Honors are recognized at a special awards ceremony on the eve of commencement, at which time they are presented the B.C. Inabinet Honors Medallion. This medallion, as well as the student's diploma, permanent transcript and commencement program, recognize Honors Program graduates as Calhoun College scholars.

In addition to the intellectual challenge of Honors, advantages of membership in Calhoun College include priority course scheduling, honors housing (space-available basis), extended library loan privileges, and special lectures and cultural events.

HONOR ORGANIZATIONS

Clemson University has a number of academic honor societies which recognize outstanding scholarship by students, faculty and staff. These include the following:

- Alpha Epsilon Delta (Biology)
- Alpha Lambda Delta (Freshman)
- Alpha Phi Mu (Industrial Engineering)
- Beta Alpha Psi (Accounting)
- Calhoun Society (Honors College)
- Chi Epsilon (Civil Engineering)
- Golden Key (Honor Society)
- Mu Beta Psi (Music)
- Omicron Delta Kappa (Juniors and Seniors)
- Order of Omega (Greek)
- Phi Kappa Phi
- Phi Sigma Pi (Honorary)
- Psi Chi (Psychology)
- Sigma Xi
- Tau Beta Pi
- Xi Sigma Pi (Forestry)

STUDY AND WORK ABROAD PROGRAMS

Clemson University provides a number of exciting study/work/volunteer abroad opportunities. Through the Study Abroad Office/Office of International Programs and Services, students can choose from a variety of programs offered overseas. Programs are varied to fulfill the needs of most students, from the Engineering Program in England, which sends students to the University of Bristol for a semester or a summer session, to the Language and International Trade Program, which encourages students to study business within a foreign context at institutions such as the Universidad de Las Américas in Puebla, Mexico.

Programs abroad and exchanges are offered in Australia, Costa Rica, Czech Republic, Ecuador, England, France, Germany, Japan, Mexico, Scotland, and Spain. Both Clemson Programs Abroad and the International Student Exchange Program (ISEP) allow a student to enroll, pay tuition, fees, and room and board directly to Clemson while they study abroad. With the ISEP Program a student can study for a semester or an entire academic year at one of more than eighty institutions world-wide. Transfer credit usually applies within the major.

Students who study abroad gain valuable experience. Internships and work abroad programs are also available. Applications are usually due in October for spring programs, in February for fall and academic year programs, and in April for summer programs. Interested students should contact the Study Abroad Advisor in E-208 Martin Hall at the beginning of each semester.

COOPERATIVE EDUCATION

The Cooperative Education Program is a planned program in which students at the University combine alternate periods of academic study and periods of related work with a participating business, industry, agency, or organization. Work periods normally take place during the sophomore and junior years (including summers), while the freshman and senior years are spent in full-time study.

Students qualify for participation in the Cooperative Education Program by satisfactory completion of thirty semester hours of academic work. Transfer students may qualify in one semester. Three, four, or five co-op work periods are projected and included in each student referral. Usually two students from the same academic area are paired to fill a full-time work position. While one student is at work, the other is enrolled in study at the University.

Students enrolled in the Cooperative Education program pay a registration fee of \$15 each semester or summer session which coincides with their work period. That fee enables students to maintain student status and participate in student activities and services that are normally associated with being enrolled at the University. However, the fee does not cover the cost of tuition for academic courses, health service, or any of the other benefits normally associated with the standard University fee. In responding to insurance, tax, loans, and other questionnaires about status, the University classifies a student on work assignment to be a full-time continuing student. The work assignment is considered an integral part of the student's education, but no academic credit is awarded for this experience.

SOUTH CAROLINA AGRICULTURAL EXPERIMENT STATION

The mission of the South Carolina Agricultural Experiment Station (SCAES) is to develop knowledge through research that will assist South Carolina's citizens in matters concerning agriculture, natural resources, and rural environment.¹ Over the years, Experiment Station scientists have made significant contributions to agriculture, from the de-

velopment of an effective fowl cholera vaccine to the development of commercially successful crop varieties. They work in new scientific areas such as packaging, ornamental horticulture, aquaculture, genetic engineering, and biotechnology.

The SCAES began in 1886 when the State's General Assembly established the Agricultural Farms and Station at the University of South Carolina in Columbia. In 1889 this research facility was renamed the South Carolina Agricultural Experiment Station and moved to the Clemson Agricultural College. The SCAES now funds scientists and research projects throughout the University. In addition, research and education facilities are located in Blackville, Florence, Charleston, and Columbia.

The SCAES's annual budget of approximately \$26 million finances the efforts of about 119 research scientists and 239 support personnel. Nearly 12,000 acres are involved in research activities.

¹With the counsel of its recently organized Advisory Board, three distinct thrust areas—agricultural productivity, quality rural environment, and agribusiness development—and three measurable success criteria—knowledge development and utilization, professional development, and public trust enhancement—have been identified for the SCAES.

CLEMSON UNIVERSITY FOUNDATION

The Clemson University Foundation is a nonprofit organization which solicits, manages, and administers gifts from private sources to the academic programs at Clemson University.

Originally chartered in 1933, the foundation is a primary component of the Administration and Advancement Program at the University. There are 29 voting members of the Board of Directors who oversee the Foundation's activities. At least 16 of the 24 elected directors are alumni of the University. Other voting directors include the President and Vice President of the Clemson University Alumni Association and President and Vice President of IPTAY. The President of Clemson University, Vice President for Administration and Advancement, and the Chief Alumni and Development Officer serve as ex-officio directors. The Director of Gift and Asset Management serves as treasurer, and the Director of Information Systems serves as secretary of the Foundation. The Vice President for Administration and Advancement serves as the Executive Vice President for the Foundation, and the Chief Alumni and Development Officer serves as Executive Director. Also represented on the Board are the Provost of the University, a deans' representative, and the President of the Faculty Senate.

The Foundation operates through an effective committee structure that reports through an executive committee to the full board. An administrative division directs its attention to real estate, investments, policy and bylaws, and nominations. A fund-raising division is managed by a Primary Gifts Committee which is responsible for the Clemson Fund, planned gifts, major gifts, and corporate and foundation solicitation. Working directly with the executive committee is the Clemson Real Estate Foundation. Market value of the assets of the Foundation as of June 1995 was approximately \$85 million plus some \$10 million in real estate holdings.

CLEMSON ALUMNI ASSOCIATION

The Clemson Alumni Association has been recognized as one of the top such organizations in the country. The mission of the Alumni Association includes three primary actions: serving, involving, and informing. The Association stresses service to more than 70,000 alumni and to a student body of 16,000. Regular programs designed to strengthen the loyalty and interest alumni have for their Alma Mater are conducted on and off campus. Some 80 Clemson Clubs are located throughout the United States, and Clemson graduates are located in every state and most foreign countries throughout the world. Reunions, student alumni programs, constituency programs and young alumni programs form the basis for an array of services to benefit Clemson and its alumni.

All services of the National Alumni Association are coordinated out of offices located in the Clemson Alumni Center, a campus focal point built, furnished, and equipped entirely by gifts from alumni especially for that purpose. Records of addresses, employment, and biographical information are kept on alumni as well as on thousands of former students who express a desire to be involved with the University and its alumni program.

A regular publication program keeps active alumni, friends, and parents aware of Clemson's outstanding programs in teaching, research, and public service. *The Clemson World* magazine is published quarterly.

Traditional programs such as the Alumni Distinguished Service Awards, professorships, Alumni Presidential Scholars, and awards for distinguished teaching, outstanding research, and public service are recognized as the most prestigious of their kind on campus.

RESERVE OFFICERS TRAINING CORPS

The Departments of the Army and the Air Force maintain ROTC units at Clemson University. Their mission is to produce officers of high quality for technical and nontechnical careers in the U.S. Army and Air Force. Two- and four-year programs are available. The four-year program consists of the basic course for freshmen and sophomores and the advanced course for juniors and seniors.

Scholarships, available to selected ROTC students, pay for tuition, books, and laboratory expenses, in addition to \$150 per month during the school year. Non-scholarship advanced cadets also receive \$150 per month. Basic course credit may be awarded to students having prior military service.

Selected advanced Air Force cadets receive flight training at government expense. Reserve or National Guard duty can be guaranteed by the U.S. Army.

Cadets who complete the Advanced or Professional Course and satisfy commissioning requirements as established by law and/or regulations are appointed Second Lieutenants. Ample opportunity exists for graduate study in both services, with temporary deferments possible.

ADMISSION

FRESHMEN

Admission to the University is competitive and is based primarily upon high school curriculum, grades, class standing, and SAT I or ACT scores. An applicant's intended major and state residency also receive consideration. To apply for admission, a candidate must submit a high school transcript through his/her counselor and have results of the SAT I or ACT sent directly from the testing agency. In addition, all South Carolina public senior colleges and universities require that applicants for freshman admission complete the following courses in high school:

English—Four credits are required, including at least two having strong grammar and composition components, at least one in English literature, and at least one in American literature. Completion of college preparatory English I, II, III, and IV will meet these requirements.

Social Studies—Three credits are required, including one unit of American history. One-half unit of government and one-half unit of economics are also strongly recommended.

Mathematics—Three credits are required. These include algebra I (for which applied mathematics I and II may count together as a substitute, if a student successfully completes algebra II), algebra II, and geometry. A fourth mathematics course is strongly recommended and should be selected from precalculus, calculus, statistics, or discrete mathematics.

Laboratory Science—Two credits are required, including at least one unit each of two laboratory sciences chosen from biology, chemistry, or physics. A third unit of a laboratory science is strongly recommended.

Foreign Language—Two credits from the same foreign language are required.

PE/ROTC—One credit in either physical education or ROTC is required.

Other—One credit is required in advanced mathematics or computer science or a combination of these; or one unit of world history, world geography, or Western Civilization.

The SAT I or ACT examination scores, rank in class, academic preparation, and recommendation of the high school counselor will be weighed carefully in the decision-making process. The applicant's acceptance will be confirmed upon presentation of a final high school transcript indicating continued academic progress and graduation.

Entrance Examinations

All freshman candidates and some transfer students must submit scores from either the SAT I or the ACT. In most cases, students transferring from accredited colleges need not submit SAT I or ACT scores if they have earned thirty or more transferable semester hours with a 2.5 grade point average (based on a 4.0 scale). Those enrolled in technical programs at technical or community colleges usually will be required to submit SAT I or ACT scores.

For August enrollment, it is recommended that students complete the SAT I or ACT no later than the preceding December. Registration materials for

these tests are readily available at high schools or can be obtained by contacting the College Board (609) 771-7600 or the American College Testing Service (319) 337-1313. All candidates must have their scores reported to Clemson by contacting the appropriate testing agency. The College Board's institutional code for Clemson is 5111. The ACT code for Clemson is 3842. Photocopies of student test reports or those submitted by third parties, such as high schools and colleges, are not accepted.

College Board Advanced Placement Program

The College Board Advanced Placement Program (AP) provides an opportunity for highly motivated high school students to begin their college careers during the last year or two of high school. AP participants take college-level courses in their high schools, sit for nationally administered examinations in the subjects concerned, and submit test grades to Clemson for credit. Credit is awarded to those earning grades of 3, 4, or 5 on AP examinations.

College Board Advanced Placement Examination		AP Grade	Credit Allowed Toward Degree	Credits
ECONOMICS	Microeconomics	3, 4, 5	ECON 200	3
	Macroeconomics	3, 4, 5	ECON 200	3
ENGLISH	Composition and Literature	3, 4	ENGL 101	3
		5	ENGL 101, 102	6
	Language and Composition	3, 4	ENGL 101	3
		5	ENGL 101, 102	6
	Both Tests	3, 4 on each	ENGL 101, 102	6
				6
GOVERNMENT	American Government	3, 4, 5	PO SC 101	3
	Comparative Government	3, 4, 5	PO SC 102	3
HISTORY	American History	3, 4, 5	HIST 101, 102	6
	European History	3, 4, 5	HIST 173	3
HUMANITIES	Music Theory	3, 4, 5	MUSIC 205, 206	6
	Music Literature	3, 4, 5	MUSIC 210	3
	Art History	3, 4, 5	A A H 210	3
	Studio Drawing	3, 4, 5	ART 205	3
	General Studio	3, 4, 5	ART 103	3
LANGUAGES	French Language	3, 4, 5	FR 101, 102	8
			FR 101, 102	8
	French Literature	4	FR 101, 102, 201	11
			FR 101, 102, 201, 202	14
	German Language	3, 4, 5	GER 101, 102	8
			LATIN 101, 102, 201	11
	Latin (either test)	4, 5	LATIN 101, 102, 201, 202	14
			SPAN 101, 102	8
	Spanish Language	3, 4, 5	SPAN 101, 102	8
			SPAN 101, 102, 201	11
MATHEMATICS	Calculus AB	3, 4, 5	MTHSC 106	4
			MTHSC 106, 108	8
	Calculus BC	3, 4, 5		
	Psychology	3, 4, 5	PSYCH 201	3
SCIENCE	Biology	3	BIOL 103, 104	8
			BIOL 110, 111	10
	Chemistry	3, 4, 5	CH 101 and 102 or 112	8
			CP SC 101	4
	Computer Science A	3, 4, 5	CP SC 101	4
	Computer Science AB	3, 4 ¹	CP SC 101	4
	Computer Science AB	5	CP SC 101, 102	8
	Physics B ²	3, 4, 5	PHYS 207, 208	8
	Physics C (Mechanics)	3, 4, 5	PHYS 122, 124	4
	Physics C (Electrical and Magnetism)	3, 4, 5	PHYS 221, 223	4

¹Students earning a grade of 4 on Computer Science may request a personal interview with a departmental representative to determine whether credit will be given for CP SC 102.

²Students enrolling in curricula requiring calculus-based physics (PHYS 122, 221, 222, 223, 224), but who earn a grade of 5 on Physics B, will be asked to meet with a departmental representative for further evaluation and placement counseling.

College Board SAT II Subject Tests

For mathematics placement, all freshmen are required to take the Mathematics Level IIC Subject Test. The College Board's Advanced Placement (AP) Examination in Calculus is the only recognized substitute. Failure to sit for one of these exams will result in placement in developmental work that, in most cases, will not apply toward the freshman mathematics requirement.

Applicants desiring advanced placement in a foreign language may take the College Board's SAT II Subject Tests, Advanced Placement (AP) Examinations, or sit for one of the tests administered by the Department of Languages during summer orientation. SAT II scores of 450 or higher enable students to exempt one or more semesters. Credit will be awarded after completion of a higher-level (qualifying) course at Clemson with a grade of "C" or higher.

Application Forms and Dates

Application forms may be obtained by writing the Office of Admissions, Clemson University, 105 Sikes Hall, Box 345124, Clemson, South Carolina 29634-5124. Application forms and catalogs for all 1997 entry dates are available beginning September 1996. Preliminary application forms are available anytime for those who wish to be included in the September mailing. Freshman candidates are especially encouraged to submit preliminary applications and sit for the SAT I or ACT during the spring semester of their junior year.

Candidates should understand that admission is closed when all classroom space has been committed. The majority of freshman admission decisions are reached during the period November through March. Transfer students seeking entrance in August usually are notified between February and July. Candidates must submit a nonrefundable fee of \$35 with their application. This fee is not applicable to waitlist and/or other University fees.

Deadlines for submitting an application are as follows:

	Freshman	Transfer
Fall Semester	May 1	August 1
Spring Semester	December 15	December 15

GED

Candidates submitting General Educational Development (GED) credentials in lieu of a high school diploma must be 19 years of age or older. Official GED score results must be received directly from the General Educational Development Testing Service along with an official copy of the high school transcript and SAT I or ACT scores. Applicants presenting the GED will be reviewed by the Admissions Exceptions Committee.

Appeals

Any freshman or transfer candidate who is denied admission may appeal for reconsideration provided the student (1) presents new information, such as improved grades and/or class rank, improved SAT I or ACT scores, or SAT II Subject Test scores; and (2) submits a letter outlining the rationale for the appeal. All appeals will be reviewed by the Office of Admissions. In some instances, appeals will be referred to the Admissions Exceptions Committee.

Admissions Exceptions

If it is not possible to make a positive decision on the basis of previous academic performance and SAT I or ACT scores, other factors, such as special talents or high school profile, may be considered. Where appropriate, the Office of Admissions will refer such cases to the Admissions Exceptions Committee. Student-athletes who do not meet regular admissions standards may be admitted if they meet Atlantic Coast Conference (ACC) and National Collegiate Athletic Association (NCAA) eligibility requirements.

Conditional Admission

Freshman students who are accepted to and enrolled in Clemson University in a conditional admissions program must meet the conditions of their admission or be subject to disenrollment from the University.

TRANSFER STUDENTS

All transfer applicants must have original transcripts of their records sent to Clemson directly from each college or university attended. Unless so stated on the transcript, the candidate should present statements of honorable dismissal and of eligibility to return to the institution last attended. To be considered for admission, candidates should have 30 semester (45 quarter) hours of work with a cumulative average of C+ (2.5 on a 4.0 scale).

SAT scores are required of some transfer students, and high school transcripts may be required in some instances. Candidates will be notified individually if either or both of these credentials are needed.

Transfer Credit

Coursework completed with a grade of C or higher at other regionally accredited institutions, including correspondence courses, telecourses, and exempted courses, will be evaluated for transfer in terms of equivalent courses included in the Clemson curriculum of the student's choice. This does not guarantee that all courses taken at other institutions will be accepted for transfer. The acceptability of each course or exemption will be based on an evaluation by the faculty concerned. Coursework earned at different institutions will not be joined to equate with one Clemson course. No course taken at a nonbaccalaureate-degree granting institution may be used as an equivalent or substitute for any 300- or 400-level Clemson course.

Learning experiences including, but not limited to, military service schools, non-collegiate sponsored instruction, work related experiences, etc. will not be evaluated for transfer; however, enrolled students may request credit by examination for any non-transferable learning experience. For additional information, see section entitled **Advanced Placement and Credit by Examination** in this catalog.

Students transferring may select the curriculum that was outlined in the *Clemson University Announcements* at the time they entered the sending institution, provided they have been in continuous enrollment. Further, transfer students may select any curriculum adopted subsequent to that initial curriculum. After enrolling at Clemson, if transfer students change from one major to another, they will com-

plete all of the requirements included in the new curriculum that are in effect at the time of the change. If all work toward a degree is not completed within six years after the initial enrollment at the sending institution, the student may be required to take additional courses.

College Board College-Level Examination Program (CLEP)

This program has very limited recognition at Clemson. A few departments accept credit for CLEP subject-matter examinations; however, CLEP General Examinations are not recognized. Credit is awarded for introductory-level courses according to criteria established by the following departments: Chemistry, English (composition only), and Mathematical Sciences (algebra and trigonometry only)—applicable principally in agricultural curricula permitting use of MTHSC 105). Numerical scores plus essays, required when offered as part of a CLEP examination, will be evaluated by the appropriate department. CLEP is designed primarily for adults with nontraditional learning experiences.

ADMISSIONS DEPOSIT

With the exception of certain University scholarship recipients, all accepted freshman and transfer candidates are required to submit a nonrefundable \$100 admissions deposit. This deposit is applicable toward tuition and other University fees.

HOUSING

All 1996-97 entering freshmen are guaranteed on-campus housing. The University Housing policy requires all freshmen to live in University housing, in their own home, or with a close relative unless circumstances dictate otherwise. New transfer students entering Clemson in 1996 will be offered University housing if space is available.

ORIENTATION PROGRAMS

The University offers a series of orientation programs during the summer for entering freshmen, transfer students, and their parents. All accepted students are expected to attend one of the sessions. During orientation students will have an opportunity to discuss their educational objectives with an advisor, to register for the fall semester, and to learn about student life and other co-curricular activities. Transfer students will have their transcripts evaluated and select appropriate courses for their first semester at Clemson.

CAMPUS VISITS AND TOURS

The University Visitors Center, currently located in Tillman Hall, offers tours to all prospective students of the University. The Center also provides information about undergraduate majors and all areas of student life. The Center is open Monday through Friday from 8:00 a.m. to 5:00 p.m., Saturday from 9:30 a.m. to 4:00 p.m., and Sunday from 1:30 p.m. to 5:00 p.m. year round. The Center is closed weekends in December and January, as well as selected University Holidays.

Walking tours of the University are provided to better acquaint visitors with the Clemson campus. Prospective student tours are scheduled daily at 9:30 A.M. and 1:30 P.M., Monday through Saturday; and Sunday at 1:30 P.M. Tours are not offered during exams and transitional days between sessions, except during June, July and August. Tours last approximately one and one half hours and are preceded by a film presentation highlighting Clemson University. Reservations are not required, but prospective students are advised to allow sufficient time to register on campus prior to tour time.

For additional information or to make appointments with departmental faculty advisors, contact the Visitors Center at (864) 656-4789.

INTERNATIONAL UNDERGRADUATES

Admissions services for undergraduate international students are provided by the Office of Undergraduate Admissions. International students who come from abroad or transfer from another school must meet academic, language and financial qualifications as determined by Clemson University. The SAT I or ACT is required of all international applicants (freshman or transfer). The Test of English as a Foreign Language (TOEFL) is required of applicants from countries where English is not the native language. Financial qualifications are determined by the submission of financial assessment and bank statements verifying adequate funding. Student visa services are provided by the Office of International Programs and Services.

SPECIAL STUDENT STATUS

The special student classification is designed for high school graduates 19 years of age or older, who wish to take a limited number of courses for personal or professional development. This program is not appropriate for individuals who are interested in earning an undergraduate degree. In addition, it is not a "trial admission" status or one for candidates who apply too late to submit credentials for consideration for regular admission. Applicants denied regular admission to Clemson are not eligible to apply as special students.

None of the usual credentials supporting an application are required of such applicants. A maximum of 18 undergraduate credit hours can be taken during the regular or summer sessions. Although it is possible to enroll in immediately succeeding semesters until the cumulative maximum of 18 credit hours is taken, students must submit a new application for each entrance period.

READMISSION OF FORMER UNDERGRADUATE

Undergraduate students who have previously attended Clemson and wish to return must secure an application for reentrance from the Registrar's Office. Students are readmitted into the major they were in when they last attended Clemson. A change of major can be initiated by picking up a form in the Student Records Office. Former students must meet the catalog curriculum requirements for graduation in effect at the time of their return. Students are required to satisfy the University's general education requirements in addition to curricular requirements. Any variations in curricular requirements will be considered under the substitution procedures. If all work toward a degree is not completed within six years after entrance, the student may be required to take additional courses. Other information can be obtained from the Registrar's Office.

POSTBACCALAUREATE

A student may be accepted by the Graduate School as a postbaccalaureate student if he/she applies to a specific graduate degree program but does not have the appropriate academic background. Such a student must be recommended by the appropriate department or program chairperson and should meet all other requirements for admission to the particular degree program with respect to grade-point ratio and standardized test scores. A student in this category who is denied admission because of failure to meet the minimum requirements has access to the same appeal procedure as any other student applying to the Graduate School.

An applicant will be classified as a postbaccalaureate student if he/she is not qualified to take at least one graduate course per semester which can be included in the minimum hours required for the graduate degree. Additionally, any student required to complete more than eighteen semester hours of undergraduate credits will be classified as postbaccalaureate. The postbaccalaureate status will remain in effect until the number of required undergraduate credit hours is less than or equal to eighteen and the student is qualified to take, each semester, a graduate course which can be included in the minimum hours required for the graduate degree. A department or a student may request postbaccalaureate status even though the above criteria are satisfied.

At the time a postbaccalaureate student becomes eligible for classification as a graduate student, the decision as to eventual admission status (full or provisional) will be made according to criteria utilized by the department and Graduate School for all other applicants to the particular degree program. The postbaccalaureate student is expected to maintain a B average and receive no grade lower than C in order to qualify for admission to a graduate program.

A postbaccalaureate student can enroll in the same number of credits per semester as any undergraduate student but cannot enroll in graduate courses or receive a graduate assistantship. No degree or certificate shall be awarded to a student in a postbaccalaureate status, and such a student who subsequently desires to obtain an additional baccalaureate degree must apply through the Office of Undergraduate Admissions. The applicability of credits earned toward the undergraduate degree will be determined by the policy pertaining to transfer students. Tuition and fees for postbaccalaureate students shall be those applicable to graduate students and are subject to out-of-state fees, if applicable.

A student possessing an undergraduate degree or a graduate degree who wishes to enroll in specific undergraduate courses for reasons other than future admission to the Graduate School shall not be classified as postbaccalaureate and shall be governed by policies established by the Office of Admissions and Registration.

FINANCIAL INFORMATION

The annual State Appropriation Act imposes the general requirement that student fees be fixed by the University Board of Trustees. The Act imposes two specific requirements on the Board: (1) In fixing fees applicable to academic and general maintenance and operation costs, the Board must maintain a minimum student fee not less than the fee charged the previous year. (2) In fixing fees applicable to dormitory rental, dining halls, laundry, infirmary, and all other personal subsistence expenses, the Board must charge students an amount sufficient to fully cover the cost of providing such facilities and services.

The tuition and fees for all undergraduate students—full or part time, and auditing—are shown below. Satisfactory settlement of all expenses is a requirement for completing each semester's class registration, and no student is officially enrolled until all past due accounts have been satisfied. Financial aid cannot be used to satisfy balances forward from a prior academic year.

In special cases the University will accept, at the beginning of a semester, a noninterest-bearing promissory note for a portion of the semester housing and semester meal plan fee. Amounts up to \$450 for room rent and \$450 for 5- or 7-day meal plans may be included in the note. In such cases, a note for the fall semester charges will be due October 1, and for the spring semester, March 1. Failure to pay the note when due will result in the assessment of late fees, including collection costs, denial of future deferred payment note privileges, and termination of board plan and/or cancellation of housing contract.

Currently enrolled students who expect to continue enrollment are given an opportunity to make housing reservations by paying a \$95 housing advance payment and by signing up on the computer during the spring semester at a time designated by the Housing Office.

New students who are offered on-campus housing accommodations must pay a nonrefundable \$15 application fee and a \$100 admissions deposit. The admissions deposit is deducted from the amount otherwise due for the first semester expenses.

TUITION AND FEES

Late Enrollment Service Charge

Registration for classes is scheduled for specific days, and certain definite procedures are outlined to prevent or reduce the problems incident to late registration. A student has not completed registration until all required steps have been taken. Any student failing to complete registration on the specified class registration days will incur a late enrollment charge, which begins at \$25 and increases \$5 each day.

TUITION AND FEES

Actual Charges for 1996-97 are not known when the catalog is printed. The charges reflected below are for 1995-96 and are subject to change as conditions warrant.

	<i>Resident Per Semester</i>	<i>Nonresident Per Semester</i>
Full-time academic fee	1,461.00	4,063.00
Part-time academic fee (per semester hour)	120.00	340.00
Auditing academic fee (per semester hour)	60.00	170.00
Staff academic fee (per semester hour)	Free first 4 hours	120.00
Graduate assistant academic fee		460.00
Laboratory fee (per laboratory); nonrefundable after last day to add		25.00
Health fee (Must be paid by any student enrolled for 7 or more hours)		95.00
Residence Halls (per semester)		
Johnstone Hall (Sections A, D-F)		755.00
Benet, Bowen, Bradley, Cope, Donaldson, Geer, Johnstone (Annexes A, F), Norris, Sanders, Wannamaker, Young		865.00
Barnett, Byrnes, Lever, Manning, Smith, Mauldin		955.00
Clemson House (room)		940.00
Clemson House (kitchenette)		980.00
Thornhill Village (four occupants)		1,040.00
Patrick Noble Calhoun Courts Apartments (four occupants)		1,160.00
Lightsey Bridge Apartments		1,190.00
McCabe and Holmes		1,100.00
Family Housing (per month)		
Townhouses		280.00
Duplex - 2 Bedroom		305.00
Duplex - 3 Bedroom		355.00
Faculty Houses		370.00
Faculty Houses (Renovated)		485.00
Thornhill Graduate Apartments		
9 month		335.00
12 month		305.00
Board Plans ¹		
Five-Day Plan (15 meals), Monday-Friday		755.00
Any 10 Plan (10 meals), Monday-Sunday		745.00
Unlimited Access, Monday-Sunday		887.00
Any 15 (Monday-Sunday)		824.00
Commuter 5 (Lunch only, Monday-Friday)		377.00
Any 40 Meals		200.00
Tiger Stripe Account (declining balance account)		5.00

¹All first-year freshmen who live in University housing (excluding Calhoun Courts, Clemson House Apartments, Lightsey Bridge Apartments, and Thornhill Village) are required to subscribe to one of the four board plans for their first two semesters. All other students have the option of selecting a meal plan on a semester basis or paying the prevailing cash price for individual meals. The Commuter 5 and Any 40 Meals do not satisfy the freshman requirement.

Full-time Fees

Undergraduates and graduate students must be enrolled in 12 semester hours to pay full-time fees. Students enrolled for less than 12 hours or who drop below 12 hours may become ineligible for some student services, financial aid, or other beneficial programs.

Part-time Fees

Undergraduate and graduate students taking less than 12 semester credit hours will be charged each semester according to the above schedule. These fees do not provide for admission to athletic events, concert series, and other such activities.

Returned Checks

A check or charge card given in payment of University expenses or a check cashed by the Univer-

sity that is returned unpaid by the bank immediately creates an indebtedness to the University. The Office of Business Affairs, G-12 Sikes Hall, administers matters related to the collection of all returned checks for students and nonstudents.

The Bursar's Office will redeposit returned checks in payment of academic fees for the fall and spring semesters. A \$20 returned check charge will be assessed for each returned item in accordance with state laws. Students with returned items for payment of academic fees are also subject to a late payment fee of \$5 per calendar day, not to exceed \$350, beginning on the day after the last day of late registration. If the note was returned to the University in a timely manner with no response by the student or drawer, a written request to disenroll the student may be made to the Registrar. If the request is approved, the percentage of refund will be applied to the debt. If the check is returned after the mid-point

of the semester with no response, a decision will be made by the Director of Business Affairs and the Registrar as to the effects of disenrollment. At this point, the student will owe 100% of tuition and fees, even if he/she has been disenrolled. The University may restrict subsequent payment for academic and other fees by accepting only cash, certified checks, cashier's checks, or money order.

Any individual who cashes a two-party check or uses a two-party check for payment of University expenses will be held responsible for that check if it is returned unpaid by the bank. Checks used as payment for various University services, such as meal plans, housing, etc., that are later returned unpaid by the bank, give the University the right to cancel such services and cause forfeiture of any refund.

Any returned check not collected by the above procedures may be turned over to a collection agency and the indebtedness reported to a credit bureau. Costs of collection will be added to the debt. Transcripts and diplomas will be withheld pending payment, and the debt may be deducted from state income tax refunds.

Abuse of check cashing and check payment privileges may result in the restriction of such privileges for an indefinite period of time based on the frequency and/or dollar amount, as determined by the Business Affairs Office.

Past Due Accounts

Any indebtedness to the University which becomes past due immediately jeopardizes the student's enrollment, and no such student will be permitted to re-enroll for an ensuing semester or summer school term. Billing fees and/or collection costs may be added to the indebtedness. Further, any student who fails to pay all indebtedness, including collection costs, to the University may not be issued a transcript or diploma. Unresolved debts may be turned over to a collection agency, be reported to a credit bureau and deducted from state income tax refunds. Debts include but are not limited to the following: parking violations, library fines, rent, academic fees, and others.

Refund of Academic Fees

(Tuition, University Fee, and Medical Fee) for Students Withdrawing, Dropping to Part Time, or Part-time Students Dropping Credit Hours No refunds will be made on a semester's tuition and fees after four weeks from the last day to register. In the case of a withdrawal from the university, refunds will be based on the effective date of the withdrawal. In the case of a withdrawal from a course, refunds will be based on the date the student drops the course using the online registration system. To be eligible for a refund, the student's request must be received by the Office of Business Affairs prior to the beginning of the next fall/spring semester or subsequent summer term. Beginning with the day following the last day to register, refunds for periods of four weeks or less during fall/spring semester shall be made on the following basis:

Fall/Spring Semester				
Period of Enrollment	Percent Refund			
Registration days in published calendar	100%			
After Late Registration: One week or less	80%			
More than 1 but not more than 2 weeks	60%			
More than 2 but not more than 3 weeks	40%			
More than 3 but not more than 4 weeks	20%			
More than 4 weeks	0%			

Summer Sessions				
	Less Than 3 Weeks	3 Weeks	5 or 6 Weeks	More Than 6 Weeks
Registration days in published calendar	100%	100%	100%	100%
After Late Registration: One week or less	0%	40%	60%	60%
More than 1 but not more than 2 weeks	0%	0%	20%	40%
More than 2 but not more than 3 weeks	0%	0%	0%	20%
More than 3 weeks	0%	0%	0%	0%

Refund of Dining Hall and Residence Hall Fees

Specific information relating to living-expense refunds is given in the sections on Housing and Student Food Service.

Refunds of Financial Aid for Students Withdrawing from the University

Refunds of academic fees are made in accordance with semester and summer session refund policies. First semester freshmen and first semester transfers receiving Title IV financial aid are under a different policy based on federal guidelines. Details are available at G-08 Sikes Hall. University housing refunds are made according to the housing contract. Meal-plan refunds are made on pro rata basis.

Since financial aid is expected to meet or help meet educational costs, any academic fee, housing, or meal-plan fee for students withdrawing from the University up to the amount of financial aid received for that semester or summer session, will be refunded to the Financial Aid Program(s) from which the student received assistance.

To determine the amount of refund that will be returned to Federal Title IV Aid Programs and what amount will be returned to the non-Title IV Aid Programs, the following formula will be used:

$$\text{Federal Title IV Refund} = (\text{Amount of Refund}) \times \frac{\text{Title IV Aid Received}}{\text{Total Aid Received}}$$

$$\text{Non-Title IV Refund} = \text{Amount of Refund minus Title IV Refund}$$

In refunding monies to the various Financial Aid Programs, the following priority listings will be used:

- A. Title IV Federal Programs
 1. Federal Stafford, Federal PLUS
 2. Federal Perkins Loan
 3. Federal Pell Grant
 4. Federal Supplemental Educational Opportunity Grant
- B. Non-Title IV Programs
 1. Institutional Loans
 2. Institutional Scholarships and/or Grants
 3. Private Loans/Scholarships

After the refund has been applied to the Title IV and non-Title IV programs, any refund balance will be refunded to the student.

If debts were incurred before withdrawing, such as bad checks, unpaid traffic fines, library fines, and others, the refund will cover these obligations first. Academic fees, housing, and meal-plan refunds for students withdrawing will be paid to the student.

Transcripts

Official transcripts may be obtained from the Transcripts/Records Office for \$5 each. A student's signature authorization must be on file before his/her records will be released. Requests for a transcript must be accompanied by payment. Transcript payments of cash, check, money order, Mastercard, Visa, or Tiger 1 Card will be accepted.

Students with past due indebtedness to the University or who are under disciplinary sanctions may not be issued transcripts. Transcripts requested in person are normally available for pickup during the next business day. Seven to ten days should be allowed for delivery of mail requests.

RESIDENT TUITION AND FEES

Application for Resident Status

Any undergraduate student or prospective student whose status concerning entitlement to payment of in-state tuition and fees is uncertain has the responsibility of securing a ruling from the University by providing all relevant information on special application forms. These forms can be obtained from the Office of Undergraduate Academic Services, 101 Sikes Hall and are to be completed and returned to that office at least two weeks prior to registration for any semester or summer term for which the student is attempting to qualify for payment of the in-state tuition and fee rate.

Entitlement

Eligibility for payment of in-state tuition and fees shall be determined under the provisions of Sections 59-112-10 through 59-112-100, South Carolina Code of Laws, 1976, as amended. This law is set forth in its entirety as follows (subject to further amendment by the General Assembly).

Statutes

Definitions—Section 59-112-10. As used in this chapter:

A. The words "State Institution" shall mean those post-secondary educational institutions under the jurisdiction of the following: (1) Board of Trustees, Clemson University; (2) Board of Trustees, Medical University of South Carolina; (3) Board of Trustees, South Carolina State College; (4) State College Board of Trustees; (5) Board of Visitors, The Citadel; (6) Board of Trustees, University of South Carolina; (7) Board of Trustees, Winthrop College; and (8) State Board of Technical and Comprehensive Education.

B. The word "student" shall mean any person enrolled for studies in any state institution.

C. The word "residence" or "reside" shall mean continuous and permanent physical presence within this State, provided, that temporary absences for short periods of time shall not affect the establishment of a residence.

D. The word "domicile" shall mean a person's true, fixed, principal residence and place of habitation; it shall indicate the place where such person intends to remain, and to which such person expects to return upon leaving without establishing a new domicile in another state. For purposes of this section one may have only one legal domicile; one is presumed to abandon automatically an old domicile upon establishing a new one. Housing provided on an academic session basis for students at State institutions shall be presumed not to be a place of principal residence, as residency in such housing is by nature temporary.

E. The words "in-state rates" shall mean charges for tuition and fees established by State Institutions for persons who are domiciled in South Carolina in accordance with this act; the words "out-of-state rates" shall mean charges for tuition and fees established by State Institutions for persons who are not domiciled in South Carolina in accordance with this act.

F. The words "independent person" shall mean a person in his majority, or an emancipated minor, whose predominant source of income is his own earnings or income from employment, investments, or payments from trusts, grants, scholarships, loan, or payments of alimony or separate maintenance made pursuant to court order.

G. The words "dependent" or "dependent person" mean: (1) one whose financial support is provided not through his own earnings or entitlements, but whose predominant source of income or support is payments from a parent, spouse, or guardian, and who qualifies as a dependent or an exemption on the federal tax return of the parent, spouse, or guardian; or (2) one for whom payments are made, under court order, for child support and the cost of his college education by an independent person meeting the provisions of Section 59-112-20 A or B. However, the words "dependent" or "dependent person" do not include a spouse or former spouse who is the recipient of alimony or separate maintenance payments made pursuant to court order.

H. The word "minor" shall mean a person who has not attained the age of eighteen years; and the words "emancipated minor" shall mean a minor whose parents have entirely surrendered the right to the

care, custody and earnings of such minor and are no longer under any legal obligation to support or maintain such minor.

I. The word "parent" shall mean a person's natural or adoptive father or mother; or if one parent has custody of the child, the parent having custody; or if there is a guardian or other legal custodian of such person, then such guardian or legal custodian; provided; however, that where circumstances indicate that such guardianship or custodianship was created primarily for the purpose of conferring South Carolina domicile for tuition and fee purposes on such child or dependent person, it shall not be given such effect.

J. The word "spouse" shall mean the husband or wife of a married person.

South Carolina Domicile Defined for Purposes of Rates of Tuition and Fees—Section 59-112-20. South Carolina Domicile for tuition and fee purposes shall be established as follows in determinations of rates of tuition and fees to be paid by students entering or attending State Institutions:

A. Independent persons who reside in and have been domiciled in South Carolina for a period of no less than twelve months with an intention of making a permanent home herein, and their dependents, may be considered eligible for in-state rates.

B. Independent persons who reside in and have been domiciled in South Carolina for fewer than twelve months but who have full-time employment in the State, and their dependents, may be considered eligible for in-state rates for as long as such independent person is employed on a full-time basis in the State.

C. Where an independent person meeting the provisions of Section 59-112-20 B above, is living apart from his spouse, or where such person and his spouse are separated or divorced, the spouse and dependents of such independent person shall have domiciliary status for tuition and fee purposes only under the following circumstances: (1) if the spouse requesting domiciliary status for tuition and fee purposes remains domiciled in South Carolina although living apart or separated from his or her employed spouse, (2) if the dependent requesting domiciliary status for tuition and fee purposes is under the legal custody or guardianship, as defined in Section 59-112-10I above, of an independent person who is domiciled in this State; or if such dependent is claimed as an income tax exemption by the parent not having legal custody but paying child-support, so long as either parent remains domiciled in South Carolina.

D. The residence and domicile of a dependent minor shall be presumed to be that of the parent of such dependent minor.

Effect of Change of Residency—Section 59-112-30. When the domicile of a student or of the person upon whom a student is financially dependent changes after enrollment at a State Institution, tuition charges shall be adjusted as follows:

A. Except as provided in Section 59-112-20B above, when domicile is taken in South Carolina, a student shall not become eligible for in-state rates until the beginning of the next academic session after expiration of twelve months from date of domicile in this State.

B. When South Carolina domicile is lost, eligibility for in-state rates shall end on the last day of the academic session in which the loss occurs; however, application of this subsection shall be at the discretion of the institution involved.

C. Notwithstanding the other provisions of this section, any dependent person who has been domiciled with his family in South Carolina for a period of not less than three years immediately prior to his enrollment may enroll in a state-supported institution of higher learning at the in-state rate and may continue to be enrolled at such rate even if the parent, spouse, or guardian upon whom he is dependent moves his domicile from this State.

Effect of Marriage—Section 59-112-40. Except as provided in Section 59-112-20 above, marriage shall affect determinations of domicile for tuition and fee purposes only insofar as it operates to evince an intention by the parties to make a permanent home in South Carolina.

Military Personnel and Their Dependents—Section 59-112-50. Notwithstanding other provisions of this act, during the period of their assignment to duty in South Carolina members of the armed services of the United States stationed in South Carolina and their dependents may be considered eligible for in-state rates. When such armed service personnel are ordered away from the State, their dependents may continue for an additional twelve months to have this eligibility at the State Institutions where they are enrolled at the time such assignment ends. Such persons and their dependents may be considered eligible for in-state rates for a period of twelve months after their discharge from the armed services even though they were not enrolled at a State Institution at the time of their discharge, if they have evinced an intent to establish domicile in South Carolina and if they have resided in South Carolina for a period of at least twelve months immediately preceding their discharge.

Faculty, Administrative Employees and Dependents Thereof—Section 59-112-60. Full-time faculty and administrative employees of State Institutions, and the spouses and children of such persons, shall be excluded from the provision of this act.

Abatement of Rates for Nonresidents on Scholarship—Section 59-112-70. Notwithstanding other provisions of this act, the governing boards listed in Section 59-112-10A above, are authorized to adopt policies for the abatement of any part or all of the out-of-state rates for students who are recipients of scholarship aid.

Administration of Chapter; Burden of Proving Eligibility of Students—Section 59-112-80. Each State Institution shall designate an official to administer the provisions of this act. Students making application to pay tuition and fees at in-state rates shall have the burden of proving to the satisfaction of the aforesaid officials of State Institutions that they have fulfilled the requirements of this act before they shall be permitted to pay tuition and fees at such rate.

Penalties for Willful Misrepresentation—Section 59-112-90. Where it appears to the satisfaction of officials charged with administration of these provisions that a person has gained domiciliary status improperly by making or presenting willful misrep-

representations of fact, such persons should be charged tuition and fees past due and unpaid at the out-of-state rate, plus interest at a rate of eight percent per annum, plus a penalty amounting to twenty-five percent of the out-of-state rate for one semester; and until these charges have been paid no such student shall be allowed to receive transcripts or graduate from any State Institution.

Regulations—Section 59-112-100. The Commission of Higher Education may prescribe uniform regulations for application of the provisions of this act and may provide for annual review of such regulations.

Regulatory Guidelines

Commission on Higher Education, Chapter 62. Statutory Authority: 1976 Code Sections 59-112-10 to 59-112-100, Determination of Rates for Tuition and Fees.

Rates of Tuition and Fees—Section 62-600.

A. Resident classification is an essential part of fee determination, admission regulations, and other relevant policies of State Institutions. It is important that such institutions have fair and equitable regulations which can be administered consistently and are sensitive to the interests of both students and the State. The Commission on Higher Education hereby establishes regulations for the Statute Governing Residency and Tuition for Fee Purposes to be applied consistently by all South Carolina institutions of higher education. These regulations do not address residency matters relating to either in-country or international categories used within the State's technical colleges.

B. Institutions of higher education are required by the State to determine the residence classification of applicants. The initial determination of one's resident status is made at the time of admission. The determination made at that time, and any determination made thereafter, prevails for each subsequent semester until the determination is successfully challenged. The burden of proof resides with the students to show evidence as deemed necessary to establish their residency status.

Code of Laws Governing Residence—Section 62-601.

A. The rules regarding the establishment of legal residence for tuition and fee purposes for institutions of higher education are governed by the South Carolina Code of Laws.

B. As prescribed by the code, residence for tuition and fee purposes can be established by (1) independent persons, (2) dependent persons, and (3) independent immigrants, or dependent immigrants

Definitions—Section 62-602.

A. Generally, a "dependent student" for tuition and fee purposes is defined as one who has abandoned all prior domiciles and has been domiciled in South Carolina continuously for at least twelve months immediately preceding the first day of classes of the term for which resident classification is sought and for whom there is an absence of such evidence in other states during any period for which residence in South Carolina is asserted. In the instances of dependent students and their families, domicile of the spouse, parent, and/or guardian for at least the twelve months immediately preceding the first day of classes of the term for which resident classification is sought is considered in determining residency status.

B. "Reside" is defined as continuous and permanent physical presence within the State, provided that temporary absences for short periods of time shall not affect the establishment of a residence. Temporary absences shall be absences which are thirty days or less. Excluded are absences associated with requirements to complete a degree, absences for military training/service, and like absences, provided South Carolina domicile is maintained. Absences of more than thirty days may affect the establishment or maintenance of residence for fee and tuition purposes. In the instance of dependents, where the spouse, parent and/or guardian "reside" will be considered in determining residency status.

C. "Domicile" is defined as true, fixed, principal residence and place of habitation, indicating where a person intends to remain, or to where one expects to return when away. Generally, an applicant must be domiciled in the State for twelve months for residency consideration.

D. "Independent Person" is defined as one in his/her majority (eighteen years of age or older), whose predominant source of income is his/her own earnings or income from employment, investments, or payments from trusts, grants, scholarships, loans, or payments made in accordance with court order. An independent person must provide more than half of his/her support during the twelve months immediately prior to the date that classes begin for the semester for which resident status is requested and cannot be claimed as a dependent or exemption on the federal tax return of his/her parent, spouse, or guardian for the year in which resident status is requested.

E. "Dependent Person" is defined as one whose predominant source of income or support is from payments from a parent, spouse, or guardian who qualifies for and is claimed as a dependent or exemption on the federal income tax return of the parent, spouse, or guardian. A dependent person is also one for whom payments are made, under court order, for child support and the cost of the dependent person's college education.

Resident Classification—Section 62-603.

A. Independent persons who have physically resided and been domiciled in South Carolina for twelve continuous months immediately preceding the date the classes begin for the semester for which resident status is claimed may qualify to pay in-state fees. The twelve-month residency period does not start until the independent person begins to take steps which indicate that the independent person intends to establish a permanent home in the State. Absences from the State for more than thirty days during the twelve-month period may affect the establishment of permanent residence for fee and tuition purposes. Steps an independent person should take to establish a permanent home in South Carolina are listed in the section entitled "Establishing the Requisite Intent to Become a South Carolina Domiciliary."

B. The resident status of a dependent person is based on the resident status of the person who provides more than half of the dependent person's support and/or claims the dependent person as a dependent for federal income tax purposes. The residence and domicile of a dependent minor and other dependent persons shall be presumed to be that of their parent(s), spouse, or guardian(s).

C. In the case of divorced or separated parents, the resident status of the dependent person may be based on the resident status of the parent who supports and/or claims the dependent person as a dependent for tax purposes, or it may be based on the resident status of the parent who has legal custody of the dependent person.

Noncitizens and Nonpermanent Residents—Section 62-604.

A. Except as otherwise specified, all noncitizens and nonpermanent residents of the United States will be assessed tuition and fees at the nonresident, out-of-state rate. Independent aliens, including refugees and their dependents, may be entitled to resident, in-state classification once they have been awarded permanent resident status by the U.S. Department of Justice and meet all the statutory residency requirements. Nonresident aliens present in the United States under the specific terms of visa classifications may be granted in-state residency for tuition and fee purposes as prescribed by the Commission on Higher Education.

B. For the purposes of this provision, the *Adviser's Manual of Federal Regulations Affecting Foreign Students and Scholars* will serve as the primary resource reference for defining visa categories.

Establishing the Requisite Intent to Become a South Carolina Domiciliary—Section 62-605.

A. Residence status may not be acquired by an applicant or student while residing in South Carolina for the sole purpose of enrollment in an institution or for access to state-supported programs designed to serve South Carolina residents.

B. If a person asserts that his/her domicile has been established in this State, the individual has the burden of proof. Such persons should provide to the designated residency official any and all evidence which the person believes satisfies the burden of proof. The residency official will consider any and all evidence provided concerning such claim of domicile but will not necessarily regard any single item of evidence as conclusive evidence that domicile has or has not been established.

C. For independent persons, examples of evidence may include, although any single indicator may not necessarily be conclusive, claims for resident classification for tuition purposes as shown below. The absence of these indicia in other states is required during any period for which domicile in South Carolina is asserted. Indicia may include the following:

- 1) financial independence from parents residing in another state or country during the twelve months immediately preceding;
- 2) the student has not lived in the home of non-resident parent(s) for more than thirty days after the time at which a South Carolina domicile is claimed;
- 3) the person can show documentation from his/her employer to support his/her claim, has filed income tax returns as an independent person in the year immediately preceding, and has been employed during the current year;
- 4) possession of a valid South Carolina voter registration card and voting in South Carolina elections;
- 5) designating South Carolina as the permanent address on all academic and employment records, including pertinent military records if one is in the military;

- 6) possession of a valid South Carolina driver's license, or if a nondriver, a South Carolina identification card;
- 7) possession of a valid South Carolina vehicle registration card;
- 8) continuous presence in South Carolina during periods when not enrolled as a student;
- 9) commitments indicating an intent to stay in South Carolina permanently;
- 10) paying South Carolina income taxes as a resident during the past tax year, including income earned outside of South Carolina from the date South Carolina domicile was claimed;
- 11) owning a principal residence in South Carolina;
- 12) establishing an abode where one's permanent belongings are kept within South Carolina;
- 13) licensing for professional practice (if applicable) in South Carolina.

D. With the exception of C.(1), C.(2) and C.(3) cited above, these indicia will likewise be considered for spouses, parents, and guardians of dependent persons who wish to establish South Carolina domicile. As noted under "Resident Classification" above, the resident status of a dependent person matches that of the person who provides more than half of the dependent person's support and/or claims the dependent person as a dependent for federal income tax purposes.

Maintaining Residence—Section 62-606.

A. A person's temporary absence from the State does not necessarily constitute loss of South Carolina residence unless the person has acted inconsistently with the claim of continued South Carolina residence during the person's absence from the State. The burden is on the person to show retention of South Carolina residence during the person's absence from the State. Steps a person should take to retain South Carolina resident status for fee and tuition purposes include continuing to use a South Carolina permanent address on all records; retaining South Carolina voter's status; voting by absentee ballot; maintaining South Carolina driver's license; maintaining South Carolina vehicle registration; satisfying South Carolina resident income tax obligation. Individuals claiming permanent residence in South Carolina are liable for payment of income taxes on their total income from the date that they established South Carolina residence. This includes income earned in another state or country.

B. South Carolina residents (and their dependents) who serve in the military may continue to be eligible to pay in-state fees as long as they continuously claim South Carolina as their state of legal residence during their military service. South Carolina residents who change their state of legal residence while in the military lose their South Carolina resident status for fee and tuition purposes. To re-establish their South Carolina resident status, such persons must take steps which indicate that they plan to re-establish permanent residence in the State. These persons must then physically reside in the State for twelve continuous months.

Effect of Change of Residency—Section 62-607.

A. If the person upon whom the dependent person is dependent moves from the State, the dependent person may enroll and continue to be enrolled at the in-state rate, provided the person upon whom

the dependent person is dependent was domiciled in South Carolina for at least three years immediately prior to the applicable term. The student may transfer to an eligible participating institution without forfeiting eligibility. Persons qualifying under this provision are eligible to pay in-state fees as long as there is not an interruption in their enrollment, summer terms excluded.

B. If a dependent or independent person has been domiciled in South Carolina for no less than three years, the person shall retain eligibility to pay in-state fees for at least twelve months following the loss of domicile.

Effect of Marriage—Section 62-608.

A. In ascertaining domicile of a married person, irrespective of gender, such a review shall be determined just as for an unmarried person by reference to all relevant evidence of domiciliary intent.

B. If a nonresident marries a South Carolina resident, the nonresident does not automatically acquire South Carolina resident status. The nonresident may acquire South Carolina resident status if the South Carolina resident is an independent person and the nonresident is a dependent of the South Carolina resident.

C. Marriage to a person domiciled outside South Carolina shall not be solely the reason for precluding a person from establishing or maintaining domicile in South Carolina and subsequently becoming eligible or continuing to be eligible for residency.

D. No person shall be deemed solely by reason of marriage to a person domiciled in South Carolina to have established or maintained domicile in South Carolina and consequently to be eligible for or to retain eligibility for South Carolina residency.

Exclusions—Section 62-609.

A. Persons in the following categories may qualify to pay in-state fees without having to establish a permanent home in the State for twelve months.

1) "Military Personnel and their Dependents": Members of the United States Armed Forces (and their dependents) who are stationed in South Carolina on active duty may be considered eligible to pay in-state fees. "Armed Forces" shall mean the United States Air Force, Army, Marine Corps, and Navy. When such personnel are ordered away from the State, their dependents may continue to pay in-state fees for an additional twelve months. Such persons (and their dependents) may also be eligible to pay in-state fees for a period of twelve months after their discharge from the military, provided they have demonstrated an intent to establish a permanent home in South Carolina and they have resided in South Carolina for a period of at least twelve months immediately preceding their discharge. Military personnel who are not stationed in South Carolina and/or former military personnel who intend to establish South Carolina residency must fulfill the twelve month "physical presence" requirement for them or their dependents to qualify to pay in-state fees.

2) "Faculty and Administrative Employees, and their Dependents": Full-time faculty and administrative employees of South Carolina state-supported colleges and universities are eligible to pay in-state fees. Dependents of such persons are also eligible.

3) "Residents with Full-Time Employment and

their Dependents": Independent persons who reside, are domiciled, and are full time employed in the State and will continue to work full time until they meet the twelve-month requirement are eligible to pay in-state fees, provided that they have taken the steps to establish a permanent home in the State (see "Establishing the Requisite Intent to Become a South Carolina Domiciliary"). The dependents of such persons are also eligible.

4) "Retired Persons": Retired persons who are receiving a pension or annuity who reside in South Carolina and have been domiciled in South Carolina as prescribed in the Statute for less than a year may be eligible for in-state rates and State-supported aid if they maintain residence and domicile in this State.

B. Full-time employment shall mean employment which consists of at least thirty-seven and a half hours a week on a single job. However, a person who works less than thirty-seven and a half hours a week but receives or is entitled to receive full-time employee benefits shall be considered to be employed full time.

C. Persons participating in Southern Regional Education Board-sponsored programs, including the Contract for Services and the Academic Common Market programs, must have continuously resided in the State for other than educational purposes for the two years immediately preceding application for consideration and must meet all residency requirements during this two-year period.

Application for Change of Resident Status—Section 62-610.

A. Persons applying for a change of resident classification must complete a residency application/petition and provide supporting documentation prior to a reclassification deadline as prescribed by the institution.

B. The burden of proof resides with those persons applying for a change of resident classification who must show required evidence to document the change in resident status.

Incorrect Classification—Section 62-611.

A. Persons incorrectly classified as residents are subject to reclassification and to payment of all nonresident fees not paid. If incorrect classification results from false or concealed facts, such persons may be charged tuition and fees past due and unpaid at the out-of-state rate. The violator may also be subject to administrative, civil, and financial penalties. Until these charges are paid, such persons will not be allowed to receive transcripts or graduate from a South Carolina institution.

B. Residents whose resident status changes are responsible for notifying the Residency Official of such changes.

Inquiries and Appeals—Section 62-612.

A. Inquiries regarding residency requirements and determinations should be directed to the institutional residency official.

B. Each institution will develop an appeals process to accommodate persons wishing to appeal residency determinations made by the institution's residency official. Neither the primary residency official nor appellate official(s) may waive the provisions of the Statute governing residency for tuition and fee purposes.

FOOD SERVICE

The University provides several economical meal plans. Harcombe and Schilleter dining halls feature an unlimited seconds policy, except on selected entrees, while Clemson House dining room, Canteen and Fernow Street Cafe serve meals on an a la carte basis. Students dining at the Clemson House may use the meal card as a cash equivalency or for a predesignated meal at no additional cost. Meals may also be purchased on a cash basis or with the Tiger Stripe Account (declining balance account).

The "branding" concept in dining facilities on college campuses is available on the Clemson campus. Li'l Dino Subs and Taco Bell Express are located at the East Campus Convenience Store; Chick-Fil-A is located at the Union Canteen; and the Pizza Hut Express is at the new Fernow Street Cafe. All of these dining facilities accept the Tiger Stripe Account and cash.

Students may choose one of several meal plans or a Tiger Stripe declining balance account. These meal plans are outlined in the Clemson Dining Service brochure. Meal plans begin immediately after a student obtains a meal plan at the beginning of the semester and end after the evening meal on the day of graduation at the end of each semester.

All first-year freshmen who live in University housing, excluding Calhoun Courts, Clemson House Apartments, Thornhill Village and Lightsey Bridge Apartments are required to subscribe to a meal plan for their first two semesters. All other students may choose a meal plan on a semester basis or pay for individual meals. First-year freshmen living in University housing (excluding the aforementioned housing) may terminate this agreement for one of the following reasons:

1. withdrawal from Clemson University.
2. change in housing assignment to an apartment with kitchen facilities.
3. medical condition with dietary requirements that cannot be met by Dining Services. Documentation from a medical doctor must be provided along with specific dietary requirements. This documentation will be reviewed by the Dining Services Food Service Administrator.
4. other circumstances determined by the University to be beyond the student's control.

Students must provide the necessary documentation for any of the above reasons before a decision on the cancellation of this contract will be considered. Upperclassmen may terminate this agreement for any reason. Failure to participate in a meal plan does not automatically release a student from his/her meal contract.

Students may change meal plans at the billing of spring semester fees with no service charge. Students may change meal plans after the first two weeks and prior to the last six weeks of the semester by paying a \$25 service charge. Changes may be made at the Tiger I Card Office in Harcombe Dining Hall on Mondays only. All adjustments will be prorated, except for students withdrawing from the University. Students may upgrade during the registration period.

Contracts canceled for any reason after service of the first meal will result in a refund of advance payment minus a \$50 termination charge and a weekly charge for meals available. The meals available charge applies to the meals that have been served, not those that have been eaten by the individual student. No refunds will be made the last six weeks of any semester. Requests for refunds may be made at the Tiger I Card Office in Harcombe Dining Hall.

TIGER STRIPE ACCOUNT (DECLINING BALANCE)

Under the Tiger Stripe Account program, monies are deposited into an account prior to usage. The Tiger Stripe Account is equivalent to a prepaid credit card. As meals or other items are purchased from dining facilities, post office, CATS, bookstore, telecommunications, Redfern Health Center, East Campus Store, Uniquely Clemson Agricultural Products Sales Center, Union Copy Center, Edgar's Game Room, vending machines, or laundry, the amount spent is deducted from the Tiger Stripe Account balance. All students are eligible. (First-year freshmen living in University housing (excluding Calhoun Courts, Clemson House Apartments, Lightsey Bridge Apartments, and Thornhill Village) during their first two semesters are required to participate in one of the meal contracts. First-year freshmen may, however, participate in the Tiger Stripe Account program in addition to the required meal contract.) There is a \$5 minimum deposit required to open a Tiger Stripe Account.

Additions to the Tiger Stripe Account after registration must be made in amounts of at least \$5. Tiger Stripe Accounts are not refundable except for students withdrawing, graduating, or not returning. Credit balances at the end of each semester will carry forward to the next semester or term. Students withdrawing during the semester must submit written requests for refunds in an amount greater than \$5. Requests will be accepted at the Tiger I Card Office not later than 30 days after the end of the semester or term for those students graduating or not returning. After this time any refunds will be forfeited. Any indebtedness to the University will be deducted from refunds issued.

UNDERGRADUATE FINANCIAL AID

The Office of Student Financial Aid administrators and/or coordinates various types of undergraduate financial aid administered by Clemson University: scholarships, loans, grants, and part-time employment. The office works jointly with the Financial Aid and Placement Committee and the University Scholarships and Awards Committee.

Students may apply after January 1 for financial assistance for the next academic year. Financial aid requests, based on financial need, must be supported by a processed Free Application for Federal Student Aid (FAFSA) and renewed annually.

The FAFSA must be submitted by February 1 for need-based scholarship consideration and by April 1 for the federally funded Federal Supplemental

Educational Opportunity Grant (FSEOG), Federal Work-Study, and Federal Perkins Loan. April 1 is the suggested deadline for application for the Federal Pell Grant and Federal Stafford Loan.

Transfer students applying for student loans will be considered as entering freshmen in determining maximum loan limits. Following registration, after the credit evaluation process has been completed, students may submit an additional request loan application for additional funds due to changes in class standing.

A brochure detailing the financial aid programs at Clemson University can be obtained from Student Financial Aid, G-01 Sikes Hall, Box 345123, Clemson University.

Satisfactory Academic Progress for Financial Aid Eligibility

Students must maintain satisfactory academic progress to be eligible for financial aid. This policy contains both qualitative (grade-point ratio) and quantitative (credit hours completed) requirements. Students must meet the grade-point ratio requirement as stated under the Continuing Enrollment Policy. Students must also complete 12, 9, or 6 hours per semester according to their enrollment (full time, $\frac{3}{4}$ time, or $\frac{1}{2}$ time) as of the last day to add a course. Students have a maximum of 12 full-time semesters in which to finish their degree, or the equivalent in part-time enrollment. Duplicate credits taken at Clemson University do not count as credits completed for satisfactory academic progress. Details are available in the publication *Financial Aid Opportunities at Clemson University*. Students wishing to appeal their academic progress status may submit a letter to Student Financial Aid. This appeals process is separate from the Appeals Committee on Continuing Enrollment. Students returning under academic renewal policy who apply for financial aid should also submit a letter to Student Financial Aid to update their academic progress record.

Educational Benefits For Veterans, War Orphans, And Children of Deceased or Disabled Law Enforcement Officers or Fire Fighters

The Veterans Administration provides educational assistance for veterans and children of deceased or totally disabled veterans who meet requirements of applicable laws and regulations. Any veteran or child of a deceased or totally disabled veteran should communicate with the nearest Veterans Administration Office to determine whether or not he/she is entitled to any educational benefits. Free tuition is available to children of South Carolina law enforcement officers or fire fighters who were totally disabled or killed in the line of duty. Certification is required from the agency of the parent's employment. Upon presentation of proof of eligibility, a student shall not become eligible for educational assistance until the beginning of the academic term.

STUDENT SERVICES

HOUSING

Single Student Housing

University housing provides a "home away from home" for approximately 6,500 single students in 20 residence halls, three apartment complexes and the Clemson House. The majority of the rooms in the residence halls are double occupancy with a limited number of single rooms available. The two-bedroom apartments each accommodate four students. All University housing is air conditioned and furnished in a manner to meet the needs of today's college student. Approximately 4 weeks after admissions application and fee are received, a packet of housing information will be mailed to students. A signed housing contract, room preference card, and a \$25 nonrefundable application fee should be returned to the Housing Office to reserve a space.

Transfer students and former students returning are offered on-campus housing if space is available.

Graduate Student Housing

Apartment-style housing designed for the specific needs and lifestyle of graduate students is available on a 9- or 12-month lease. Each apartment is double occupancy, thus allowing space for privacy in an area conducive to studying. Graduate and former students interested in on-campus housing should contact the Housing Office, Assignments, 200 Mell Hall, Box 344075, Clemson, SC 29634-4075. Refunds are made according to the Housing contract.

Family/Faculty Housing

Clemson provides comfortable and economical housing with 100 apartments, conveniently located on campus, for married and single-parent students. Only students with graduate assistantships or fellowships are given priority for this housing. Brochures and application forms are available from the Family Housing Office, Clemson University, 200 Mell Hall, Box 344075, Clemson, SC 29634-4075.

REDFERN HEALTH CENTER

The student health center consists of three divisions, housed in Redfern Health Center: Medical Services, Counseling and Psychological Services (CAPS), and Health Education/Alcohol and Drug Education.

Medical Services

Redfern Health Center, an outpatient facility, operates Monday–Friday, 7:30 A.M.–5:00 P.M. during the academic year (summer hours 8:00 A.M.–4:30 P.M.). Students are seen appointment. The CU NOW Clinic is available to those students who do not have an appointment. ASK-A-NURSE telephone services are available after hours. The student health center offers a variety of medical services, including outpatient ambulatory care, pharmacy, lab, x-ray, and specialty clinics including women's health, dermatology, and orthopedic.

A completed medical history questionnaire is required of all students entering the University for the first time. Documentation of two red measles (ubeola) vaccines since the student's first birthday

is also required. Students born prior to January 1, 1957, are exempt from the measles requirements. A tuberculin skin test (PPD) is required within the past year. Students with a history of a positive skin test are required to have a chest x-ray within the past year. Students not in compliance with immunization requirements will not be allowed to complete registration.

Counseling and Psychological Services

CAPS strives to provide quality counseling and mental health services to enhance students' intellectual, social and personal growth. CAPS provides a safe, confidential place for students to talk about the problems they face. Counselors work with students to help improve self-awareness and understanding as well as to improve coping skills. All information is kept confidential and separate from medical and academic records. CAPS offers individual and group counseling for a wide range of personal problems, including anxiety, depression, suicidal thoughts, sleep and eating disturbances, identity problems, loss of motivation, difficulty coping, sexual concerns, relationship problems, substance abuse, and adult children of alcoholics. Counseling groups are also offered for students with learning disabilities. Testing is provided to assess learning disabilities and attention deficit disorder as well as to aid in the diagnosis of problems. Some testing services require a fee, but most services are free of charge.

Health Education/Alcohol and Drug Education

Health Education provides information, prevention, education and wellness challenges on a wide variety of subjects, such as alcohol and other drugs, sexuality issues, leadership, nutrition, and stress management. Health Education provides the opportunity to develop leadership by becoming a Peer Educator. Alcohol and Drug Education offers social host training and on-campus party registration.

Financial Considerations

Health Fee. University policy requires that all students registered for seven or more credit hours during the fall or spring semester or four or more credit hours in a summer session pay the University health fee. The health fee allows students access to the professional services of University physicians/nurse practitioners, counselors, and health educators at no additional cost; reduced costs for medical diagnostics; and after-hours urgent care insurance benefits. Students pay for pharmaceuticals, orthopedic equipment, specialty clinics, and psychological testing. Payment is expected at the time of service. Students may pay in cash, check, MasterCard, Visa or Tiger Stripe.

Health Insurance. The University offers an accident and sickness insurance plan to help cover major medical expenses. Information is sent to all students prior to the fall semester. Students are strongly encouraged to have comprehensive health insurance coverage during their tenure at the University.

After Hours. Students may call the ASK-A-NURSE telephone service at 656-2233, Sunday–Thursday, 4:00 P.M.–8:00 P.M. A registered nurse is available to answer questions, provide health information, and

schedule appointments. Students requiring the care of a physician after hours may choose from area emergency rooms and urgent care facilities including Clemson Health Center, Oconee Memorial Hospital, Anderson Area Medical Center, Baptist Medical Center, and Greenville Memorial Medical Center. Medical costs incurred are the student's responsibility. Students should contact Redfern the next business day for follow-up care. On-campus medical emergencies are transported by the University ambulance to the closest community medical resource. The University ambulance is staffed with certified emergency medical personnel 24 hours a day. Students are required to pay for off-campus ambulance transportation except for those medical resources within the city of Clemson for after-hours urgent care.

CAREER SERVICES

The Career Center assists students with all aspects of career planning and helps them find summer internships and full-time employment.

To help in planning college major and career direction, the Career Planning Department, located in 207 Holtzendorff, offers career-interest testing, individual and group counseling, computerized career guidance and a library with up-to-date information on all Clemson majors and thousands of careers.

The Placement Office in the Career Center coordinates campus interviews with representatives from business, industry, and government agencies. A sophisticated employer database makes it convenient for students to research employers or to sign up for interviews from computers anywhere on campus. Seminars, video tapes, and individual assistance with resumes, interviews, and job-search strategies are also available. Services of the Placement Office, including on-campus interviews, are available to students for the first semester after graduation. Information on alumni services is available from the Career Center.

DISABILITY SERVICES

Clemson University is committed to providing equal educational opportunities to all students and assisting them in making their college experiences successful and positive. The Office of Disability Services serves the special needs of students with permanent disabilities. Individuals requesting services should provide current documentation of their disability from their physician or other professional to the Office of Disability Services. Prospective students are encouraged to visit the campus and schedule a meeting with the staff of Disabilities Services to discuss special needs.

Clemson University recognizes a student with a disability as anyone who has a physical or mental impairment that substantially limits one or more of his/her major life activities. In compliance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, the University has appointed a coordinator of Student Disability Services, a University committee on Access and Accommodations for Individuals with Disabilities, and an ADA Compliance coordinator whose primary responsibilities include helping students integrate into the normal academic process. Additional information is available in the Office of Disability Services, University Union.

ACADEMIC REGULATIONS

Proper discharge of all duties is required at Clemson University, and a student's first duty is his/her scholastic work. All students should be thoroughly acquainted with these basic requirements.

CREDIT SYSTEM

The semester hour is the basis of all credits. Generally, one recitation hour or three laboratory or shop hours a week for a semester constitute a semester hour. Thus, in ENGL 101 Composition I, 3(3,0), as this subject is listed in the *Courses of Instruction* section of this catalog, the student takes three semester hours. When the course is completed satisfactorily, three credit hours are entered on the student's record. The notation "3(3,0)" means that the course carries three credits, has three clock hours of theory or recitation per week, and no laboratory hours. CH 101 General Chemistry, 4(3,3), carries four semester hours, has three hours of theory, and a three-hour laboratory period.

Credit Load

Except for an entering freshman who is restricted to the curriculum requirements of his/her major course, the credit load for an undergraduate must be approved by the class advisor. The class advisor will approve a credit load deemed in the best interest of the student based on such factors as course requirements, grade-point ratio, participation in other activities, and expected date of graduation.

The maximum number of hours in which a student may enroll is 21, and 15 hours is the maximum credit load for those on probation. Permission of the department chair in which the student is a major is required for all registration involving more than 21 hours, or 15 hours for those on probation.

Full-time Enrollment

In fall and spring semesters, enrollment in 12 or more credit hours is considered full time. Combined enrollment in 12 or more hours in Maymester and first and second summer terms is considered full time for the summer. Fewer than 12 credit hours is part time.

Advanced Placement and Credit by Examination

In addition to earning credit by the usual method involving classroom attendance, a student may receive credit toward his/her degree by completing a course successfully by examination only. Freshmen interested in exempting some elementary courses in this manner should participate in the College Board Advanced Placement Examination program and have the results of these tests sent to Clemson.

Certain departments will also grant credit for successful completion of College-Level Examination Program (CLEP) subject examinations which are administered by the College Board.

Enrolled students may earn credit by means of a special examination without the necessity of class attendance subject to the following requirements:

1. The applicant must present evidence indicating that he/she has received training or taken work which is approximately equivalent to that given in the course at Clemson for which an examination is requested.

2. The applicant must not have previously failed or audited the course at Clemson.

3. The applicant must apply in writing for the examination, and the request must be approved by the instructor, chair of the department in which the course is taught, and the Office of Records and Registration. Application forms are available in the Office of Records and Registration.

4. Credit (CR) will be awarded for acceptable work in lieu of letter grades in recognition of college-level achievement as determined by College Board Advanced Placement Examination, College-Level Examination Program subject examination, institutional special examinations, and similar instruments.

Transfer Credit

For Clemson students, coursework completed with a grade of C or higher at other regionally accredited institutions, including correspondence courses, telecourses, and appropriate exemption credit, will be evaluated for transfer in terms of equivalent courses included in the Clemson curriculum of the student's choice. This does not guarantee that all courses taken at other institutions will be accepted for transfer. The acceptability of each course or exemption will be based on an evaluation by the faculty concerned. Coursework earned at different institutions will not be joined to equate with one Clemson course. No course taken at a nonbaccalaureate-degree granting institution may be used as an equivalent or substitute for any 300- or 400-level Clemson course.

Learning experiences including, but not limited to, military service schools, non-collegiate sponsored instruction, work related experiences, etc. will not be evaluated for transfer; however, enrolled students may request credit by examination for any non-transferable learning experience. For additional information, see section entitled *Advanced Placement and Credit by Examination* in this catalog.

Approval of each course should be obtained by the student prior to scheduling the class. By obtaining advance approval, the student is assured of receiving proper credit at Clemson upon satisfactory completion of the course. Information and forms relative to this approval may be obtained in the Student Records Office, 104 Sikes Hall.

GRADING SYSTEM

The grading system is as follows:

A—*Excellent* Indicates that the student is doing work of a very high character, the highest grade given.

B—*Good* Indicates work that is definitely above average, though not of the highest quality.

C—*Fair* Indicates work of average or medium character.

D—*Pass* Indicates work below average and unsatisfactory, the lowest passing grade.

F—*Failed* Indicates that a student knows so little of the subject that it must be repeated in order that credit may be received.

I—*Incomplete* Indicates that a relatively small part of the semester's work remains undone. Grade I is not given a student who made a grade F on his/her daily work. Students are allowed thirty days after the beginning of the next scheduled session, excluding summers and regardless of the student's enrollment status, to remove the incomplete grade. Normally, only one extension for each I may be granted, and this under unusual circumstances. The extension must be approved in writing by the instructor of the course and the chair of the department in which the course was taken. The extension will indicate the nature and amount of work to be completed and the time limit. (Students under this policy are prohibited from removing the I by repeating the course.) A letter grade of I converts to F unless the incomplete is removed within the time specified.

W—*Withdrew* This grade indicates that the student withdrew from the course or was withdrawn by the instructor after the first four weeks of classwork and prior to the last five weeks of classes, not including the examination period. Proportionate time periods apply during summer sessions. Each undergraduate student is allowed to withdraw or be withdrawn with a grade of W from no more than 14 hours of coursework during the entire academic career at Clemson University. Transfer students may withdraw from no more than 10 percent of the total work remaining to be done in the chosen undergraduate curriculum at the time of transfer to Clemson University up to a total of 14 hours of coursework, whichever is fewer. Partial credit for courses cannot be dropped. A student who exceeds these limits of hours or who is enrolled during any part of the last five weeks of classes shall have final grades recorded. A student may withdraw from the University subject to the restrictions above. Any variance from these restrictions must be approved by the provost or the provost's designee and must be requested within 90 calendar days (exclusive of summer vacation) from the date printed on the grade report. The student must document the circumstances supporting the request. For financial aid purposes, enrollment is defined and satisfactory academic progress levels are established as of the last day to register or add classes. Withdrawals can negatively impact financial aid eligibility if a student does not complete a sufficient number of hours. Details are available in the publication *Financial Aid Opportunities at Clemson University*.

Grade-Point Ratio

In calculating a student's grade-point ratio, the total number of grade points accumulated by the student is divided by the total number of credit hours attempted at Clemson during the semester, session, or other period for which the grade-point ratio is calculated. For each credit hour, the student receives grade points as follows: A-4, B-3, C-2, D-1. No grade points are assigned for grades of F, I, P, or W.

Pass/Fail Option

Juniors or Seniors enrolled in a four-year curriculum may take four courses (maximum of 15 credit hours), with not more than two courses in a given semester on a Pass/Fail basis. Transfer and five-year program students may take Pass/Fail courses on a pro rata basis. Only courses to be used as free electives may be taken optionally as Pass/Fail.

Letter-graded courses which have been failed may not be repeated Pass/Fail.

Registration in Pass/Fail courses will be handled in the same manner as for regular enrollment. Departmental approval must be obtained via approval form and returned to the Office of Records and Registration in accordance with the University calendar for adding courses. Instructors will submit letter grades to the Office of Records and Registration. These grades will be converted as follows: A, B, C to P (pass); D, F to F (fail). Only P (minimum letter grade of C) or F will be shown on a student's permanent record and will not affect the grade-point ratio.

If a student changes to a major which requires a previously passed course, and this course has been taken Pass/Fail, he may request either to take the course on a letter-graded basis, the P be changed to C, or substitution of another course.

In the event limited enrollment in a class is necessary, priority will be given as follows: majors, letter-graded students, Pass/Fail students, and auditors.

ROTC Credit

No more than ten hours of Aerospace Studies or Military Science may be counted toward the baccalaureate degree in any curriculum.

Mid-term Grades

Once, near mid-term, in every course the instructor shall make available for each student (a) that student's ranking to-date in that course or (b) that student's course grade to-date, relative to the grading system stated in the course syllabus.

This feedback should occur near mid-term, but it shall occur no later than the course meeting prior to the last day to withdraw without final grades. More frequent feedback is strongly encouraged.

Both student and instructor are to recognize that this feedback reflects the student's performance up to that point in time, and as such, that student's final course grade may change based upon subsequent course work performance(s).

The policy includes all undergraduate courses and does apply to summer school.

Final Examinations

The standing of a student in his work at the end of a semester is based upon daily classwork, tests or other work, and the final examinations. Faculty members may excuse from the final examinations all students having the grade of A on the coursework prior to the final examination, but for all other students written examinations are required in all subjects at the end of each semester, except in certain laboratory or practical courses in which final examinations are not deemed necessary by the department faculty.

Final examinations must be given on the dates and at the times designated in the final examination schedule.

Grade Reports

Final grade reports are mailed to enrolled students at the end of each semester, or summer session if appropriate, at their home addresses.

Dropping Classwork

A subject dropped after the first four weeks of classwork and prior to the last five weeks during the fall and spring semesters is recorded as W—Withdrew. Proportionate time periods apply during summer sessions.

Continuing Enrollment Policy

At the end of any enrollment period, a notice of academic probation shall be placed on the grade report of an undergraduate student if his/her cumulative grade-point ratio is below 2.0, which is the minimum necessary for graduation.

In the event that a student is placed on academic probation, notification to that effect will be placed on the grade report for that session in which the student's academic deficiency occurred and for each session the student remains on probation. The student who clears probation by returning to the graduating academic requirement (2.0) will have notice to that effect placed on the grade report for that session. No notation concerning probation is placed on the student's permanent record.

A student on academic probation will be suspended or dismissed at the end of the spring semester if his/her cumulative grade-point ratio is below the minimum cumulative grade-point ratio (MCGPR). Students entering Clemson University for the first time will not be subject to suspension until the student has attempted coursework at Clemson for two semesters, that is, fall and spring semesters (not necessarily consecutive enrollment). The minimum cumulative grade-point ratio is 2.0 for students with credit levels greater than or equal to 95 hours. For students with credit levels less than 95 hours, the MCGPR is given in the table below. CL in the table is the student's credit level, based on all credits taken at Clemson, plus any advanced standing received from transfer credits and credits based on approved examination programs.

A student who passes at least 12 semester credit hours and earns a 2.2 semester grade-point ratio on all hours attempted in the most recent semester (fall or spring) or summer session(s) is permitted to continue enrollment even though his/her cumulative grade-point ratio is below the required minimum grade-point ratio, defined above.

A student's first failure to qualify for continued enrollment will subject him/her to suspension from the University for the next fall or spring semester. Notice of academic suspension will appear on the permanent record.

Students subject to suspension or dismissal may appeal to the Appeals Committee on Continuing Enrollment at the end of the spring semester or summer session(s). The Appeals Committee on Continuing Enrollment meets approximately two weeks after final exams following spring and second summer session. Appeals must be in the Office of Undergraduate Academic Services no later than one week following exams. An appeal must include a complete explanation for the student's poor academic performance. To the extent possible, verifiable documentation should also be included. Students are strongly encouraged to submit a letter directly to the chairperson of the Appeals Committee on Continuing Enrollment from the pertinent department chair (or designate) or academic advisor stating support of the student for continued enrollment in that department. Appeals will be granted only in the most exceptional cases, and a student will be allowed to continue on appeal only once prior to dismissal. Students who return on a successful appeal must meet the conditions specified by the Appeals Committee on Continuing Enrollment.

Students subject to suspension or dismissal after the spring semester will be permitted to enroll in summer school and may have their regular enrollment reinstated immediately if the summer school work brings their cumulative grade-point ratio above the

CL	MCGPR	CL	MCGPR	CL	MCGPR	CL	MCGPR
16	1.28	36	1.68	56	1.85	76	1.94
17	1.31	37	1.69	57	1.85	77	1.94
18	1.35	38	1.70	58	1.86	78	1.94
19	1.37	39	1.72	59	1.86	79	1.95
20	1.40	40	1.73	60	1.87	80	1.95
21	1.43	41	1.74	61	1.88	81	1.95
22	1.45	42	1.75	62	1.88	82	1.96
23	1.47	43	1.75	63	1.89	83	1.96
24	1.50	44	1.76	64	1.89	84	1.96
25	1.52	45	1.77	65	1.89	85	1.97
26	1.53	46	1.78	66	1.90	86	1.97
27	1.55	47	1.79	67	1.90	87	1.97
28	1.57	48	1.79	68	1.91	88	1.97
29	1.59	49	1.80	69	1.91	89	1.98
30	1.60	50	1.81	70	1.92	90	1.98
31	1.62	51	1.82	71	1.92	91	1.98
32	1.63	52	1.82	72	1.92	92	1.99
33	1.64	53	1.83	73	1.93	93	1.99
34	1.66	54	1.84	74	1.93	94	1.99
35	1.67	55	1.84	75	1.93	95	2.00
						95+	2.00

The values in this table are based on the following formula: $MCGPR = 2.25 \times (CL / (CL + 12))$

minimum cumulative grade-point ratio or if the student passes at least twelve semester credit hours and earns a 2.2 grade-point ratio on all hours attempted during the summer session(s).

When a student is suspended or dismissed for academic reasons, ineligibility to continue officially commences on the first day of classes of the very next semester (fall or spring, as appropriate) immediately following the decision of ineligibility.

Upon enrolling after suspension, a subsequent failure to meet the requirements for continued enrollment before clearing probation will result in dismissal from the university, and notice of dismissal will appear on the permanent record. Dismissals are for one calendar year.

A student who has been dismissed may file a petition for re-admission with the Appeals Committee on Continuing Enrollment after one calendar year. If this petition is denied, the student may file subsequent petitions for readmission after any intervening term of enrollment. Dismissed students who are readmitted and again fail to meet the requirements for continuing enrollment will be dismissed and may not appeal to continue.

This continuing enrollment appeals process is separate from the unsatisfactory academic progress appeal with Student Financial Aid. Students subject to suspension or dismissal must be allowed to continue enrollment before submitting a satisfactory academic progress appeal for financial aid eligibility. Further information on satisfactory academic progress is available in the Financial Information section and in the publication *Financial Aid Opportunities at Clemson University*.

Grade Protests

A student wishing to protest a course grade must first attempt to resolve any disagreement with the instructor. If unable to reach a satisfactory resolution, the student may follow the procedures listed under "Academic Grievance Committee" in the *Student Handbook and Announcements*. Grievances must be filed within 90 calendar days (exclusive of summer vacation) from the date printed on the grade report.

Repeating Courses Passed

A student may repeat a course he has passed with a grade lower than B. Both grades will be calculated in the grade-point ratio; however, credit for the course will be counted only once toward the number of hours required for graduation. For financial aid purposes, duplicate credits do not count as credits completed for satisfactory academic progress. If a student repeats a course he has passed with a grade of B or better, the credits attempted as well as credits and grade points earned will be removed from the cumulative summary.

Repeating Courses Failed

A student who has failed a course (made F) cannot receive credit for that course until it has been satisfactorily repeated hour for hour in a class; except that in the case of correlated laboratory work, the number of hours to be taken shall be determined by the instructor. Where separate grades for class and laboratory work are given, that part of the subject

shall be repeated in which the failure occurs. Successfully repeating a course previously graded F does not erase the original F grade from the student's record. Both grades will appear on the record and will be computed in the grade-point ratio.

GRADUATION REQUIREMENTS

A candidate for an undergraduate degree is a student who has turned in a completed diploma application by the deadline prescribed in the University calendar for a particular graduation date.

Residence Requirement

To qualify for an undergraduate degree, a student must complete from Clemson a minimum of 30 of the last 36 credits presented for the degree.

Make-up of I's Received in Last Semester

A candidate for a degree who in the semester immediately prior to graduation receives one or more grades of I shall have an opportunity of removing the unsatisfactory grades provided the final grades are received in the Office of Records and Registration, 104 Sikes Hall, by the time grades for candidates for graduation are due. A candidate who qualifies for graduation under this regulation will be awarded his/her degree on the regular date for the award of degrees.

Special Requirements

A cumulative grade-point ratio of 2.0 is required for graduation. Candidates for degrees are required to apply for their diplomas within three weeks following the opening of the final semester or the opening of the first summer session prior to the date the degrees are to be awarded. Applications should be filled out in the Office of Records and Registration, 104 Sikes Hall, on the forms provided. All work for a degree must be completed, all financial settlements made, and all government property and library books returned by 5:00 P.M. on the Tuesday preceding graduation.

Credit Limitation

If all work toward a degree is not completed within six years after entrance, the student may be required to take additional courses.

Academic Honors

Honor Graduates

To be graduated with honors a student must have a minimum cumulative grade-point ratio as follows: cum laude—3.4, magna cum laude—3.7, and summa cum laude—3.9.

Honor Lists

At the end of the fall and spring semesters, the following lists shall be compiled of undergraduate students who have achieved grade-point ratios of 3.5 to 4.0 on a minimum of 12 semester hours, exclusive of Pass/Fail coursework.

Dean's List—3.5 to 3.99 grade-point ratio
President's List—4.0 grade-point ratio

Honors and Awards

The University offers a number of awards for outstanding achievement in specific fields and endeavors.

Recipients are chosen by selection committees and are announced at the annual Honors and Awards Day program or other appropriate ceremonies. Detailed information relating to such awards is available in the offices of the academic deans and department chairs.

CLASSWORK

Course Prerequisites

Prerequisites for each course are enumerated under each course in the *Courses of Instruction*. In addition to these requirements, colleges and departments may also establish other standards as conditions for enrollment. Refer to individual college and curricular information for specific standards.

Class Attendance

College work proceeds at such a pace that regular attendance is necessary for each student to obtain maximum benefits from instruction. Regular and punctual attendance at all class and laboratory sessions is a student obligation, and each student is responsible for all the work, including tests and written work, in all class and laboratory sessions. No right or privilege exists that permits a student to be absent from any given number of class or laboratory sessions except as stated in the syllabus for each course. At the same time, it is obvious that students have valid reasons for missing classes; the instructors are expected to be reasonable in the demands they place on students. In this regard, instructors must inform the students in the syllabus required in every class what constitutes excessive absences and the penalty, if any, for such absences. Faculty who impose penalties for excessive absences must keep accurate attendance records.

Some students are on scholarships and/or grants-in-aid overseen by the University Scholarships and Awards Committee. The acceptance of such scholarships and/or grants-in-aid may require participation in events both on and off campus. Additionally, students occasionally are required to miss class because of participation in co-curricular activities, such as class trips, that the faculty members note on their syllabi. The student must discuss these activities with the faculty members whose classes will be missed well in advance of their occurrences. The documentable absences are necessary, and the instructor will make arrangements for those students to make up graded work that takes place during those necessary absences. The time, location, and nature of the make-up work will be at the discretion of the instructor. If required, documentation will be provided to instructors by students. Instructors are expected to set policies that are reasonable in working with those student personal documentable absences that are truly beyond the student's control. After reviewing the reason given for the absence, the instructor at his/her discretion may allow the student to make up the graded work missed.

All other aspects of class attendance are within the discretion of the instructor, department, or college responsible for the course. If a student feels unfairly treated in any attendance-related situation, the student has the right of appeal to the Academic Grievance Committee.

First Day Class Attendance

All students are required to attend the first scheduled day of classes and labs for which they are registered. If a student cannot attend a class, then he/she is responsible for contacting the instructor of that class to indicate the his/her intent to remain in that class. If a student does not attend the first class meeting or make contact with the instructor by the second class/lab meeting or the last day to add, whichever comes first, the instructor has the option to drop that student from the class/lab.

Dead Days and Reading Day

During fall and spring semesters only, on Wednesday and Thursday immediately preceding final exam week, all regularly scheduled classes are conducted; however, course testing on these days is limited to scheduled final laboratory exams, make-up tests and final examinations in courses which meet for one hour of lecture or two or more hours of laboratory. These days are designated *dead days*.

During fall and spring semesters only, on Friday immediately preceding final exam week, classes are limited to scheduled final laboratory exam periods and final examinations in courses which meet for one hour of lecture or two or more hours of laboratory. This day is designated *reading day*.

NOTE: Dead days and reading day do not apply to courses numbered 600 or above.

Auditing Policies

Qualified students may audit courses upon the written approval of the instructor. Auditors are under no obligation of regular attendance, preparation, recitation, or examination and receive no credit. Participation in classroom discussion and laboratory exercises by auditors is at the discretion of the instructor. A student who has previously audited a course is ineligible for credit by examination.

Undergraduate and graduate students enrolled in 12 or more hours may audit courses at no additional charge. Others interested in auditing should verify their eligibility through the Registrar's Office.

Cross-Listed Courses

A cross-listed course is one that can be taken for credit under different departmental titles. For example, students can take Demography as either RS 471 or SOC 471. The student should select the desired departmental title in conference with an advisor. The departmental title may be changed only during the period allowed by the University calendar for adding a course.

Enrollment in Graduate Courses

Enrollment of Clemson University seniors in any graduate course is subject to approval by the department offering the course and the Graduate School. This approval is required prior to registration and may be obtained by completing and returning to the Graduate School Office the appropriate form (Form GS6, available at the Graduate School Office). The total course work load for the semester must not exceed 18 hours, and the cumulative graduate credits earned by seniors shall not exceed 12 semester hours.

Seniors with a cumulative grade point ratio of 3.0 or higher may enroll in 700- or 800-level courses and may use these courses to meet requirements for the bachelor's degree. However, courses used for this purpose cannot be counted later toward an advanced degree. Alternatively, such students may take 600-, 700- or 800-level courses in excess of the requirements for their undergraduate degrees and may request that these courses be included as a part of their graduate program if they are subsequently admitted to the Graduate School. Courses cannot be taken at the 600 level if their 300- and 400-level counterparts are required for the undergraduate degree in the same academic major as the proposed graduate degree.

A Clemson senior with a cumulative grade-point ratio less than 3.0 may apply to the Graduate School for conditional acceptance. If accepted, the student may enroll in graduate courses for inclusion in a future graduate program, subject to approval of Form GS6. The form must be turned in and accepted by the Graduate School before a student can register for graduate courses.

In all cases, the credits and quality points associated with senior enrollment in graduate courses will be part of the undergraduate record.

ACADEMIC RECORDS

The student's permanent academic record is maintained in the Registrar's Office and contains personal identifying information, grades, and credits. Where appropriate, statements of a corrective nature, withdrawals, suspension for failure to meet academic standards, suspension for disciplinary reasons, and graduation data are added. It is a historical record of the student's academic progress.

Classification

All new students are classified as freshmen unless they have attended another college prior to entrance. Students who have completed college work elsewhere will be classified on the basis of semester hours accepted at Clemson rather than the amount of work presented. To be classified as a member of any class other than freshman, students must meet the credit-hour requirements below:

- Sophomore—30 credit hours
- Junior—60 credit hours
- Senior—95 credit hours

Academic Advising

Each student is assigned to an academic advisor in his/her major area. It is the responsibility of the student to consult with the advisor during registration. The advisor will assist the student in scheduling courses so as to fulfill the requirements of the degree program. Nevertheless, it is the responsibility of the student to fulfill the relevant requirements of the degree. Advisors also maintain files on individual advisees to assist in academic planning.

Withdrawal from the University

A student may withdraw from the University subject to the restrictions in the section on *Withdrawal*. Students who exceed these restrictions shall have final grades recorded. Any variance from the restrictions must be approved by the provost or the provost's designee and must be requested within 90

calendar days (exclusive of summer vacation) from the date printed on the grade report. The student must document the circumstances supporting the request. For financial aid purposes, enrollment is defined and satisfactory academic progress levels are established as of the last day to register or add classes. Withdrawing from the University can negatively impact financial aid eligibility if a student has not completed a sufficient number of hours. Details are available in the publication *Financial Aid Opportunities at Clemson University*.

Academic Renewal

The student who has not enrolled for a period of two or more academic years may apply to the Appeals Committee on Continuing Enrollment for readmission under special conditions known as academic renewal. Under these conditions, the previous credits attempted and quality-point deficit will not constitute a liability in a new grade-point computation. However, no credits passed or their attending quality points will be available to the student for a degree at Clemson. The previous record will appear on the permanent record as well as the notation of readmission under the policy of academic renewal. Students returning under the academic renewal policy who apply for financial aid should submit written notification of their status to student Financial Aid in order to update their academic progress record.

ACADEMIC GRIEVANCE COMMITTEE

I. General

The Academic Grievance Committee hears all grievances involving the following: (a) allegations of undergraduate student academic dishonesty; (b) allegations by undergraduate students against a faculty or staff member of discrimination in academics on the basis of race, color, national origin, sex, age, religion, disability, or veterans status (except in those cases where the grievance involves student employment); (c) grievances of a personal or professional nature involving an individual undergraduate student and a faculty member; and (d) claims by undergraduate students concerning the inequity of final grades. (The only aspects of a final grade case that are grievable are claims by students of final grades being changed because of personal or professional reasons. Students may not grieve issues such as quality of instruction or the difficulty of testing, for example.) In all unresolved cases, the committee makes its recommendations to the President through the Provost. All proceedings of the committee are confidential. (For possible grievances arising from the inability to understand teachers whose first language is not English, the student must follow the English Fluency Policy referenced in *The Student Handbook*.)

The Academic Grievance Committee is composed of twenty-eight members as follows:

A. Fifteen members of the faculty; three members from each college. Members are appointed on a staggered basis by the respective college deans and serve for a period of three years. Term commences with fall semester registration.

B. Twelve undergraduate students, nominated by the student body president, approved by the Stu-

dent Senate and appointed by the Provost for one-year terms. Nominations should be made in the spring semester. Term of service commences with fall semester registration. At least one and no more than three students shall be appointed from any one college.

C. Dean of Student Life (or designee);

D. The Senior Vice Provost and Dean of Undergraduate Studies shall appoint the chairperson from those faculty members who have previously served.

II. Academic Dishonesty

A. General

1. Academic dishonesty includes giving, receiving or using unauthorized aid on any academic work.

2. Plagiarism, a form of academic dishonesty, includes the copying of language, structure or ideas of another and attributing the work to one's own efforts.

3. All academic work submitted for grading contains an implicit pledge and may contain, at the request of the instructor, an explicit pledge by the student that no unauthorized aid has been received.

4. Academic dishonesty includes attempts to copy, edit or delete computer files that belong to another person or use of Computer Center account numbers that belong to another person without the permission of the file owner, account owner or file number owner.

B. Penalties

1. Penalties for a first offense are at the discretion of the instructor but shall not exceed receiving a grade of F for the course.

2. A student guilty of the second offense of academic dishonesty will receive a grade of F for the course, will be suspended for one or more semesters and may be permanently dismissed. Suspension or dismissal requires approval of the President of the University.

C. Procedures

1. Academic honesty is the individual responsibility of each student. Students should report violations of this policy either to the faculty member of the affected course or to a department chair or dean in the course area or to the student's academic advisor.

2. When, in the opinion of a faculty member, there is evidence that a student has committed an act of academic dishonesty, the faculty member should contact the Ombudsman in the Office of Undergraduate Academic Services to discuss the evidence and see if the seriousness warrants a formal charge of academic dishonesty.

3. If the faculty member decides to file a formal charge, the following procedure must be followed:

a) The faculty member will inform each involved student in private of the nature of the alleged charge of academic dishonesty and will subsequently request in writing that the department chair verify from the registrar the incident's being a first offense.

b) When this information has been received, the faculty member will notify the student in writing of the charge of academic dishonesty and the penalty recommended by the faculty member and approved by the chair of the department in which the course is taught, with a copy to the registrar. (Note: Faculty should consider presenting the written notification to the student personally or by receipted cer-

tified mail.) The notification will further state that if the student regards the charge as unfair, the student has 14 calendar days from the date of receipt of notice to file a grievance with the Academic Grievance Committee (see below).

c) If no grievance is filed by the student, the faculty member will forward copies of the written notification to the dean of the college and to the registrar.

d) A charge of academic dishonesty in a course must be made within 45 calendar days of the date printed on the grade report for the semester or session in which the course is completed. A grade of I (Incomplete) is considered to be final when it is removed.

III. Rules and Procedures for Academic Dishonesty Grievances

1. The only two aspects of an academic dishonesty case that are grievable are (a) whether the student is guilty of academic dishonesty; or (b) if proper procedures are followed. *Note:* Other aspects of the case may be grievable under Section IV.

2. Any student filing a grievance must first attempt to resolve it by consulting with the involved faculty member for resolution. In the event no resolution is reached, the student shall consult serially with the Ombudsman in the Office of Undergraduate Academic Services, the department chair and dean of the faculty member, who shall hear the grievance and act as mediators. The Ombudsman, dean, department chair, faculty member and student shall make every effort to reach a solution.

3. If the grievance remains unresolved, the student may bring a written statement detailing the grievance before the Academic Grievance Committee. The student must report to the Office of Undergraduate Academic Services and secure a checklist form which the student will use to document the following: (a) the dates of those consultations described in Procedure 2, above, (b) the names of those persons consulted, and (c) the signature of the collegiate dean attesting that no resolution could be reached. (Note: If all parties agree, the checklist may be signed and dated during the initial consultation.) Both the written statement and the checklist form must be delivered to the Office of Undergraduate Academic Services within 14 calendar days from the date of receipt of a written charge made by the faculty member. The grievance is considered filed when the written statement and the checklist are returned to the Office of Undergraduate Academic Services. The Office of Undergraduate Academic Services will retain the original documents, forward a copy of the grievance to the chairperson of the Academic Grievance Committee, and will also forward proper notification of the filed grievance to the Office of Records and Registration. The failure of a student to file a grievance within the 14 calendar day period will cause him/her to forfeit his/her right to file a grievance under this procedure. (d) If a student files a grievance, the professor has 90 days (excluding summer) to respond.

4. The documents referred to in Procedure 3, shall be delivered to the chairperson of the Academic Grievance Committee. The chairperson shall, upon receipt of the documents, appoint a subcommittee consisting of a chairperson who is a faculty or staff

member of the committee and at least two other committee members, including at least one student, to investigate the grievance. If possible, the subcommittee shall include members who are not in the same college as the grievant.

5. The committee members appointed by the chairperson will constitute the subcommittee to investigate the grievance. A minimum of three subcommittee members, including at least one student member, must be present for the subcommittee to conduct the hearing described in Procedure 8.

6. The subcommittee to investigate the grievance will attempt to gather all information pertinent to the grievance in separate meetings with the individuals who give information concerning the grievance. However, after the separate meetings have been held, the subcommittee may question the student and faculty member simultaneously in one meeting. Such a joint meeting will be held only if the subcommittee deems it necessary for clarifying the facts.

7. The Academic Grievance Committee will, to the greatest extent possible, handle each case in a confidential manner.

8. The hearing on the grievance will be informal and shall be closed to the public. The chairperson shall take whatever action is necessary to ensure an equitable, orderly and expeditious hearing. Minutes of the meeting shall be taken, and all parties to the grievances shall be given an opportunity to be heard. Each party is responsible for having present at the hearing all witnesses that he/she wishes to speak on his/her behalf. In addition, the chairperson may request the presence of any other person who can supply information pertinent to the grievance. Witnesses shall not be present during the hearing proceedings except when they are called to speak before the committee. The parties shall be permitted to question all individuals who are heard by the committee. If any witness is unable to be present at the hearing, the chairperson may, at his/her discretion, accept a written statement from that witness to be presented at the hearing. The parties shall be accorded the right to assistance of counsel of their own choice; however, counsel shall not be permitted to participate actively in the proceedings.

9. Upon conclusion of the hearing, the subcommittee shall reach, by majority vote, a posed solution to the grievance. The subcommittee chairperson shall then formulate the findings in writing and seek to obtain from the parties involved in the grievance signed acceptance for a recommended solution to the grievance. If all parties to the grievance accept the solution posed by the subcommittee, the matter of the grievance will be considered closed when the solution has been implemented. Copies of the written findings and recommended solution will be forwarded by the subcommittee chairperson to all parties to the grievance for acceptance in person or via return receipted certified mail. Each party will be asked to indicate acceptance of the posed solution by signing and returning the letter within 14 calendar days of its date. Failure to respond within 14 calendar days will constitute acceptance. Proper notification of the solution arrived at by the Academic Grievance Committee will then be mailed by the subcommittee chairperson to the Office of Records and Registration, faculty member, depart-

ment chair of the student's major department, department chair and dean of the department and college where the course is taught, and the Director of Undergraduate Academic Services.

10. If, after the conclusion of the hearing on the grievance, the chairperson cannot secure acceptance of the posed solution, the grievance shall be referred to the President of the University via the Provost with the committee's recommended solution to the grievance along with all supporting evidence previously submitted to the Academic Grievance Committee. Should the grievance be forwarded to the President, both parties to the grievance shall be informed of this. When grievances are referred in this manner, the President, on behalf of the University, shall make the final decision on the solution to the grievance and will then notify the Office of Records and Registration, faculty member, department chair of the student's major department, department chair and dean of the department and college where the course is taught, and Director of Undergraduate Academic Services of the University's final decision.

11. The chairperson shall keep in confidence all records pertinent to each grievance and pass these records to the Office of the Provost for filing. Records shall be available to succeeding chairpersons of the Academic Grievance Committee.

12. The Academic Grievance Committee shall make every reasonable effort to resolve every grievance presented to it by the end of the semester in which each grievance is received.

13. These procedures can be changed by the Commission on Undergraduate Studies. Such changes shall not affect any case under consideration at the time of the change. Notification of any changes to the procedures shall be given to the President of the University via the Academic Council.

IV. Rules and Procedures for Grievances Other Than Academic Dishonesty Grievances

1. Any student filing a grievance must first attempt to resolve it by consulting with the involved faculty or staff member for resolution. In the event no resolution is reached, the student shall consult serially with the Ombudsman in the Office of Undergraduate Academic Services, the department chair and dean of the faculty member, who shall hear the grievance and act as mediators. The Ombudsman, dean, department chair or immediate staff superior, faculty or staff member and student shall make every effort to reach a solution.

2. If the grievance remains unresolved, the student may bring a written statement detailing the grievance before the Academic Grievance Committee. The student must report to the Office of Undergraduate Academic Services and secure a checklist form which the student will use to document the following: (a) the dates of those consultations described in Procedure 1, above, (b) the names of those persons consulted, and (c) the signature of the collegiate dean attesting that no resolution could be reached. (Note: If all parties agree, the checklist may be signed and dated during the initial consultation.) Both the written statement and the checklist form must be delivered to the Office of Undergraduate Academic Services within 90 calendar days (exclu-

sive of summer vacation) from the date the student alleges to have been aggrieved; or, in a case involving a protest of a final grade, the grievances must be filed within 90 calendar days (exclusive of summer vacation) from the date printed on the grade report for the term in which the student alleges that an inequitable grade was recorded. The Office of Undergraduate Academic Services will retain the original documents and forward a copy of the grievance to the chairperson of the Academic Grievance Committee. In a case involving a protest of final grade, the Office of Undergraduate Academic Services will notify the Office of Records and Registration of the filed grievance. The failure of a student to file a grievance within the 90-day period will cause him/her to forfeit his/her right to file a grievance under this procedure. (d) If a student files a grievance, the professor has 90 days (excluding summer) to respond.

3. The documents referred to in Procedure 2, shall be delivered to the chairperson of the Academic Grievance Committee. The chairperson shall, upon receipt of the documents, appoint a subcommittee consisting of a chairperson who is a faculty or staff member of the committee and at least two other committee members, including at least one student, to investigate the grievance. If possible, the subcommittee shall include members who are not in the same college as the grievant.

4. The committee members appointed by the chairperson will constitute the subcommittee to investigate the grievance. A minimum of three subcommittee members, including at least one student member, must be present for the subcommittee to conduct the hearing described in Procedure 7.

5. The subcommittee to investigate the grievance will attempt to gather all information pertinent to the grievance in separate meetings with the individuals who give information concerning the grievance. However, after the separate meetings have been held, the subcommittee may question the student and faculty or staff member simultaneously in one meeting. Such a joint meeting will be held only if the subcommittee deems it necessary for clarifying the facts.

6. The Academic Grievance Committee will, to the greatest extent possible, handle each case in a confidential manner.

7. The hearing on the grievance will be informal and shall be closed to the public. The chairperson shall take whatever action is necessary to ensure an equitable, orderly and expeditious hearing. Minutes of the meeting shall be taken, and all parties to the grievance shall be given an opportunity to be heard. Each party is responsible for having present at the hearing all witnesses that he/she wishes to speak on his/her behalf. In addition, the chairperson may request the presence of any other person who can supply information pertinent to the grievance. Witnesses shall not be present during the hearing proceedings except when they are called to speak before the committee. The parties shall be permitted to question all individuals who are heard by the committee. If any witness is unable to be present at the hearing, the chairperson may, at his/her discretion, accept a written statement from that witness to be presented at the hearing. The parties shall be

accorded the right to assistance of counsel of their own choice; however, counsel shall not be permitted to participate actively in the proceedings.

8. Upon conclusion of the hearing, the subcommittee shall reach, by majority vote, a posed solution to the grievance. The subcommittee chairperson shall then formulate the findings in writing and seek to obtain from the parties involved in the grievance signed acceptance for a recommended solution to the grievance. If all parties to the grievance accept the solution posed by the subcommittee, the matter of the grievance will be considered closed when the solution has been implemented. Copies of the written findings and recommended solution will be forwarded by the subcommittee chairperson to all parties to the grievance for acceptance via return receipted certified mail. Each party will be asked to indicate acceptance of the posed solution by signing and returning the letter within 14 calendar days of its date. Failure to respond within 14 calendar days will constitute acceptance. Proper notification of the solution arrived at by the Academic Grievance Committee will then be mailed by the subcommittee chairperson to the involved faculty or staff member, department chair of the faculty member or immediate superior of staff member, the involved collegiate dean, and Director of Undergraduate Academic Services. In a case involving a protest of a final grade, the subcommittee chairperson will also notify the Office of Records and Registration of the solution arrived at by the Academic Grievance Committee.

9. If, after the conclusion of the hearing on the grievance, the chairperson cannot secure acceptance of the posed solution, the grievance shall be referred to the President of the University via the Provost with the committee's recommended solution to the grievance along with all supporting evidence previously submitted to the Academic Grievance Committee. When grievances are referred in this manner, the President, on behalf of the University, shall make the final decision on the solution to the grievance and will then notify the involved faculty or staff member, department chair of the involved faculty member or immediate superior of the staff member, involved collegiate dean, and Director of Undergraduate Academic Services of the University's final decision. In a case involving a protest of a final grade, the President will also notify the Office of Records and Registration of the University's final decision.

10. The chairperson shall keep in confidence all records pertinent to each grievance and pass these records to the Office of the Provost for filing. Records shall be available to succeeding chairpersons of the Academic Grievance Committee.

11. The Academic Grievance Committee shall make every reasonable effort to resolve every grievance presented to it by the end of the semester in which each grievance is received.

12. These procedures can be changed by the Commission on Undergraduate Studies. Such changes shall not affect any case under consideration at the time of the change. Notification of any changes to the procedure shall be given to the President of the University via the Academic Council.

GENERAL EDUCATION

An undergraduate student whose enrollment in a curriculum occurs after May 15, 1996, must fulfill the general education requirements in the catalog in effect at the time. A student who withdraws from the University and subsequently returns after May 15, 1996, will be required to satisfy the general education requirements. Any variation in curricular or general education requirements shall be considered under the substitution procedure.

MISSION STATEMENT

Academic institutions exist for the transmission of knowledge, the pursuit of truth, the intellectual and ethical development of students, and the general well-being of society. Undergraduate students must be broadly educated and technically skilled to be informed and productive citizens. As citizens, they need to be able to think critically about significant issues. Students also need to be prepared to complete undergraduate work and a major course of study. The mission requires a high level of knowledge about and competence in the following areas: communication, computer use, mathematics, problem solving, natural sciences, social sciences, humanities, and arts. Thus the mission of general education is to provide Clemson undergraduate students with a structured base through which these needs can be met.

COURSE REQUIREMENTS

The general education requirements in some curricula are more restrictive than the general requirements shown below.

Courses approved for Oral Communication, Writing Intensive or Computer Skills credit are indicated in the **Courses of Instruction** in brackets (e.g. ENGL 314 3(3.0) [W.3]). Other courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. Students should consult their advisors.

A. Communication and Speaking

Skills 12 hours

1. ENGL 101 and ENGL 102 6 hours

2. Oral Communication 3 hours

ENT 305	O.2
SPCH 150	O.3
SPCH 250	O.3
SPCH 251	O.3

3. Writing Intensive 3 hours

ENGL 314	W.3
ENGL 316	W.3
ENGL 333	W.3
ENGL 334	W.3
ENGL 345	W.3
ENGL 386	W.1
HIST 365	W.2
M E 401	W.2
M E 402	W.1

B. Computer Skills 3 hours

C E 251	C.1
CP SC 101	C.3
CP SC 110	C.3
CP SC 120	C.3
M E 205	C.1
PRTM (FOR) 209	C.3

C. Mathematical Sciences 6 hours

EX ST 301	
MTHSC 101, 102, 106, 108, 115*, 116*, 203, 207, 301	

*Exception: MTHSC 115 and 116 may be used by students graduating in Early Childhood Education, Elementary Education, or Special Education only.

D. Physical or Biological

Science 8 hours

A two semester sequence in the same physical or biological science, each including a laboratory

ASTR 101/103, 102/104
BIOL 103, 104, 110, 111
CH 101, 102, 105, 106
GEOL 101/103, 102, 112/114
PH SC 107, 108
PHYS 122/124, 207, 208, 221/223, 222/224

E. Humanities 6 hours

1. Three hours selected from sophomore literature courses (200 level only) or foreign language literature (300 level or higher)

ENGL 202, 203, 204, 205, 206, 207, 208, 209, H210
FR 301, 302, 407, 408, 499
GER 401, 402, 403
SPAN 303, 304, 311, 401, 402, 403, 422, 499

2. Three hours selected from the following:

A A H 210
C H S H103
ENGL 202, 203, 204, 205, 206, 207, 208, 209, H210, 300, 350, 351, 353, 355, 356, 357, 380, 385, 386
FR 201, 202
GER 201, 202
HUM 301, 302, 305, 306, 309
MUSIC 210, 311, 312, 315, 316
PHIL 101, 102, 103, 303, 304, 315, 316, 317, 318, 320, 323, 324, 325, 326, 327, 330, 343, 344, 345
REL 101, 102, 301, 306, 307
SPAN 201, 202
SPCH 365, 369
THEA 210, 315, 316, 317
W S 301

F. Social Science 6 hours

A A S 301
AGRIC 105
AP EC 202, 302, 309, 319, 490
C H S H101, H102
C R D 357, 361
ECON 200, 201, 211, 212, 301, 302, 306, 307, 308, 309, 310, 314, 315, 403, 404
GEOG 101, 103, 220, 301, 302, 303, 305, 330, 340, 350

HIST 101, 102, 122, 172, 173, 300, 301, 302, 303, 304, 305, 307, 311, 312, 313, 314, 316, 318, 321, 322, 323, 325, 327, 328, 329, 330, 333, 338, 339, 340, 341, 342, 351, 354, 355, 361, 363, 365, 370, 372, 373, 374, 375, 377, 378, 380, 381, 384, 385, 386, 387, 390, 391, (F&RR) 392, 393
PO SC 101, 102, 302, 361, 381, 404
PRTM 201, 301
PSYCH 201, 306, 308, 330, 333, 340, 343, 344, 345, 352, 368, 370
R S 301, (SOC) 359, (SOC) 401

COMPETENCY GOALS

A. Communication and Speaking Skills

A.1. English 101 and English 102

Students completing English 101 with a passing grade should be able to demonstrate the following knowledge and skills:

1. An understanding of and ability to use the full range of the writing process including invention, drafting, revising, and editing.
2. The ability to write about fictional and/or non-fictional texts, using correct form in quoting and documentation.
3. The capacity to write a unified, coherent short essay (2-4 pages) with a suitable introduction and conclusion, well-organized and sufficiently developed paragraphs, and enough detail to support their generalizations.
4. A basic control over sentence structure including not only grammatical correctness but also some evidence of syntactical maturity in terms of sentence length, complexity, and variety.
5. Basic competence in punctuation, spelling, and other mechanics.

Students completing English 102 with a passing grade should be able to demonstrate all the knowledge and skills required for English 101 plus the following:

1. The capacity to summarize, analyze, and evaluate college-level texts, including argumentative pieces expressing opinions different from their own.
2. The ability to use basic library resources including available data bases to find sources.
3. The ability to incorporate existing research into their own writing citing appropriate documentation.
4. The ability to organize and sustain the coherence of a longer (5-8 pages) expository or argumentative paper that avoids major logical fallacies, recognizes and responds to counter-arguments, and shows a rhetorical awareness of audience.
5. Skills at using varied sentence structure and length and appropriate sentence style and diction.

A.2. Oral Communication

1. Students who successfully complete oral communication skill courses to satisfy the General Education requirements will report that speaking assignments enhanced their course experience and improved their learning of course materials.

- Students who successfully complete oral communication skill courses to satisfy the General Education requirements will report that they believe oral communication competencies are important to success in their respective fields.
- Students who successfully complete oral communication skill courses to satisfy the General Education requirements will report that they have significant reduced apprehension about speaking situations, as measured by a "Communication Apprehension" assessment instrument.
- Students who successfully complete oral communication skill courses to satisfy the General Education requirements will report increased confidence in their willingness to communicate, as measured by significant improvement on the "Willingness to Communicate" assessment instrument.
- Students who successfully complete oral communication skill courses to satisfy the General Education requirements will report improved confidence in their use of language, body movement and gestures, and visual aids appropriate to the speaking context(s) they have studied.
- Teachers of oral communication skill courses will report that oral communication assignments and exercises improved student learning of course materials.
- Teachers of oral communication skill courses will report that student speaking and listening improved in response to constructive feedback.

A.3. Writing Intensive Courses

- Anonymous evaluators of student portfolios from W courses will report that at least 90% of students' writing samples meet or exceed the criteria for acceptable writing endorsed by teachers of those courses.
- Students who have taken W courses will report that the writing assignments improved their learning of course material.
- Students who have taken W courses will report that receiving constructive feedback on their writing and being given the opportunity to revise their writing enabled them to improve their writing.
- Students who have taken W courses will report that they believe effective writing is important to success in their respective fields.
- Students who have taken W courses will report increased confidence in their ability to meet the professional demands of writing in the work place.
- Teachers will report that writing assignments in W courses improved student learning of course material.
- Teachers will report that student writing in W courses improved in response to constructive feedback.

B. Computer Skills

The Computer Skills requirement is intended to achieve three goals. The first goal is to prepare students for the use of computer technology in their personal and professional lives. The second goal is to assist the students in developing a set of skills in using the computer in the areas of management and organization of data and the communication of

ideas. The third goal is to introduce the students to the legal, ethical, and moral implications of the continuing advances in information technology.

Following completion of the Computer Skills general education requirement, students will be competent in the operation of a number of standard computer tools including word processors, spreadsheets, and communication tools (for example, electronic mail and remote file access). Students will be able to utilize these tools to present information in an organized and effective manner. Students will also be able to interpret and accommodate current capabilities and future advances in computer technology, in the context of legal, ethical, and moral guidelines, to support their decision making.

C. Mathematical Sciences

An education that reflects only the restricted mathematical needs of the distant past is not adequate for students who will live their professional lives in the twenty-first century. Therefore, the mathematical sciences requirement is designed to achieve the following competency goals:

- To develop in students a high level of mathematical literacy in order that they be able to adequately cope with the demands of an information-based age. This basic literacy may assume different forms, depending upon the students' academic curricula. For example, developing skills in applying the methods of modern data analysis and statistical inference, mastering the more classical deterministic methods of calculus, or (for future teachers of elementary school children) to actively engage fundamental mathematical concepts in the ways that we would have them to teach: to explore, investigate, validate, discuss, represent and construct.
- To enable students to become confident in their ability to do mathematics and to grasp the implications of the many mathematical concepts that permeate our lives, concepts such as chance, rates of change, logic, and graphs.
- To develop in students the ability to communicate and to reason mathematically, because mathematics today involves much more than calculation. Clarification of the problem, formulating alternatives, developing appropriate tools, and analyzing the consequences are all part of mathematical communication and reasoning.

D. Physical or Biological Science

Science is required of Clemson undergraduates to achieve two goals. The first goal is to expose students to the scientific philosophy that the natural world is mechanistic and largely predictable, and can be systematically studied using empirical methods. Mastery of these methods requires particular reasoning skills. Following successful completion of the physical/biological science requirement, students should have an understanding of the relationship among hypotheses, experiments, and theories. They should be able to use the methods of scientific inquiry, such as, framing a question precisely, developing hypotheses, designing experiments, collecting and analyzing data, drawing conclusions and making a defensible claim.

The second goal is to familiarize the students with the major principles and theories of a particular science, its historical development, and its significance for a broader world. This knowledge will give students the factual basis they need to practice the scientific method successfully in a particular discipline.

E. Humanities

The humanities is a broad category of study concerned with human nature, thought, emotion, values, interrelations, and culture. Unlike the sciences and the social sciences, the field of humanities is designed principally to insure that all students receive a balance of courses which generally are not applied or performance based. Specifically, the courses which fulfill the humanities general education requirement should build the following competencies: a reflective habit of mind, self and social awareness, a knowledge and appreciation of the development of our culture and those foreign to ours, a heightened aesthetic and ethical sensibility, an understanding of the diverse forms of expression, the ability to think critically, and good communication skills. Humanities courses should develop as many of these competencies as possible.

F. Social Science

The general education social science requirement will introduce students to human social and cultural diversity. The courses will provide students with a deeper understanding of the causes and consequences of human actions, thereby increasing their awareness of global concerns. The social science courses will also reinforce communication skills and challenge students to enhance their critical thinking and intellectual development.

- Asterisks indicate the minors that are **NOT** accepted for the major.
- Numbers following the minors indicate the college offering the minor.

²Cluster minor, Group II Administration is not acceptable for the BS in Accounting, Economics, Financial Management, Industrial Management, Management, and Marketing.

³For the Bachelor of Arts only.

MINORS

Accounting (3)
Adult/Extension Education (1)
African American Studies (2)
Agricultural Business Management (1)
Agronomy (1)
Anthropology (3)
Aquaculture, Fisheries & Wildlife Biology (1)
Beef Cattle Production (1)
Biochemistry (1)
Bioengineering (4)
Biological Sciences (1)
Business Administration (3)
Chemistry (4)
Cluster
Communications (2)
Computer Science (4)
Early Intervention Specialist (5)
Economics (3)
Elementary Education (5)
English (2)
Entomology (1)
Environmental Science (1)
Environmental Systems Engineering (4)
Finance (3)

Agricultural and Applied Economics (BS)								*				
Agricultural Economics								*				
Community and Rural Development								*				
Agricultural Education (BS)								*				
Agricultural Engineering (BS) [†]								*				
Agricultural Mechanization and Business (BS)								*				
Agromony (BS)				*				*				
Animal Industries (BS)								*				
Animal, Dairy and Veterinary Sciences								*				
Poultry Science								*				
Aquaculture, Fisheries & Wildlife Biology (BS)					*			*				
Biochemistry (BS)						*		*				
Biological Sciences (BA, BS)							*	*				
Entomology (BS)								*		*		
Food Science (BS)								*				
Forest Products (BS)								*				
Forest Resource Management (BS)								*				
Horticulture (BS)								*				
Turfgrass								*				
Medical Technology (BS)								*				
Microbiology (BS)								*				
Packaging Science (BS)								*				
Plant Pathology (BS)								*				
Prepharmacy (non-degree)								*				
Prephysical Therapy (non-degree)								*				

Construction Science and Management (BS)										*				
Design (BA, BS)										*				
English (BA)	*		*	*	* * *					*		*	*	
Fine Arts (BFA)										*				
History (BA)	*		*	*	* * *					*		*		
Landscape Architecture (BLA)										*				
Language & International Trade (BA)										*				
Modern Languages (BA)	*		*	*	* * *					*		*		
Philosophy (BA)	*	*	*	*	* * *					*		*		
Speech & Communication Studies (BA)	*	*	*	*	* * *					*		*		

[illegible]

[illegible]

Asterisks indicate the minors that are NOT accepted for the major.

	MINORS														
	Accounting (3)	Adult/Extension Education (1)	African American Studies (2)	Agricultural Business Management (1)	Agromony (1)	Anthropology (3)	Aquaculture, Fisheries & Wildlife Biology (1)	Beef Cattle Production (1)	Biochemistry (1)	Bioengineering (4)	Biological Sciences (1)	Business Administration (3)	Chemistry (4)	Cluster	Communications (2)
	Computer Science (4)	Early Intervention Specialist (5)	Economics (3)	Elementary Education (5)	English (2)	Entomology (1)	Environmental Science (1)	Environmental Systems Engineering (4)	Finance (3)						
Industrial Management (BS) ²															*
Management (BS) ²															*
Marketing (BS) ²															*
Political Science (BA)	*		*	*			*	*							*
Psychology (BA)															
Sociology (BA)	*		*	*			*	*							*
COLLEGE OF ENGINEERING AND SCIENCE (4)															
Agricultural Engineering (BS) ¹															*
Ceramic Engineering (BS)															*
Chemical Engineering (BS)															*
Chemistry (BA, BS)										*					*
Civil Engineering (BS)															*
Computer Engineering (BS)															*
Computer Information Systems (BS)													*		*
Computer Science (BA, BS)													*		*
Electrical Engineering (BS)															*
Engineering Analysis (BS)															*
Geology (BA, BS)															*
Industrial Engineering (BS)															*
Mathematical Sciences (BA, BS) ³	*		*	*			*	*					*		*
Mechanical Engineering (BS)															*
Physics (BA, BS)															*
Textile Chemistry (BS)															*
Textile Management (BS)															*
Textile Science (BS)															*
COLLEGE OF HEALTH, EDUCATION AND HUMAN DEVELOPMENT (5)															
Early Childhood Education (BA)															*
Elementary Education (BA)													*		*
Health Science (BS)															
Industrial Education (BS)													*		*
Mathematics Teaching (BS)													*		*
Nursing (BS)													*		
Parks, Recreation & Tourism Management (BS)															
Science Teaching (BS)													*		*
Biological Sciences									*				*		*
Earth Sciences													*		*
Physical Sciences													*		*
Secondary Education (BA)													*		*
English													*	*	*
History & Geography													*	*	*
Mathematics													*	*	*
Modern Languages													*	*	*
Political Science													*	*	*
Psychology & Sociology													*	*	*
Special Education (BA)													*	*	*

[illegible]

PROGRAMS AND DEGREES

Clemson University offers 74 undergraduate degree programs under the colleges of Agriculture, Forestry and Life Sciences; Architecture, Arts and Humanities; Business and Public Affairs; Engineering and Science; and Health, Education and Human Development.

MINORS

A minor consists of at least 15 semester credits, with no fewer than 9 credits at the 300 level or higher. Courses used to fulfill general education requirements, options, and electives may be counted toward the minor. However, a student cannot major and minor in the same field. A minor may be declared with the written approval of the major advisor. The advisor shall contact the department offering the minor. A minor may be acquired with either the Bachelor of Arts or the Bachelor of Science degree. The minor will be posted to the student's transcript but not on the diploma. Specific requirements for each minor are detailed below.

Accounting

A minor in Accounting requires ACCT 201, 202, 204, 301, 302, and completion of one of the following sequences: (1) ACCT 303, 406, 410; (2) ACCT 322, 340, 445; or (3) ACCT 322, 404, 415.

Adult/Extension Education

A minor in Adult/Extension Education requires AG ED 403, 440, 445, and six additional credits selected from the following: AG ED 407, 428, 432, 450, 482, PRMT 308.

African American Studies

A minor concentration in African American Studies requires 15 credits at the 300 and 400 level, distributed as follows:

Group I—Three Credits from A A S 301 or 498.

Group II—Three credits from GEOG 330, HIST 338, 339, 438.

Group III—Three credits from any approved African American Studies minor in Group III: ENGL 482, 483, HIST 311, 312, PO SC 381, SOC 460, THEA 317.

Group IV—Three credits in any approved course in social sciences.

Group V—Three credits in any approved course in humanities.

No course that is used to meet the requirements of a disciplinary major may be used to meet the African American Studies minor requirements. The courses in this minor are to be scheduled in consultation with the appropriate advisors. African American Studies advisors will provide all affected advisors with a list of approved courses prior to registration.

Agricultural Business Management

A minor in Agricultural Business Management requires APEC 302, 309, 319 and at least two courses selected from APEC 308, 351, 402, 409, 433, 452, 456, 460.

Agronomy

A minor in Agronomy requires AGRIC 104, AGRON 202, and nine or more credits at the 300 level or higher.

Anthropology

A minor concentration in Anthropology requires ANTH 201 and 15 hours from the following courses: ANTH 301, 320, 351, 401, 403, ENGL 300, SOC 433. At least one course must be at the 400 level. Students majoring in English or Sociology and minoring in Anthropology may not count their major courses toward their minor or vice versa.

Aquaculture, Fisheries and Wildlife Biology

A minor in Aquaculture, Fisheries and Wildlife Biology requires W F B 350 and 12 credits selected from 300-level or higher wildlife and fisheries biology courses, except W F B 463 and 490.

Beef Cattle Production

A minor concentration in Beef Production requires ADVSC 202, 301, 390, 401; two credits from ADVSC 108, 210, 306, 455; and three credits from ADVSC 310, 353/355, 452, 453.

Biochemistry

A minor concentration in Biochemistry requires BIOCH 301, 423 or 431, 432, 433, 434 (13 credits), plus any other biochemistry courses at the 300 level or above, for an additional four credits.

Bioengineering

A minor in Bioengineering requires at least 15 credits and must include BIO E 302, 320 and 401. The remaining six credits may be chosen from BIO E 201, 420, 450, BIOSC 222, 223, 430, 458, 459, CRE 210, E M 304, or M E 204.

Biological Sciences

A minor concentration in Biological Sciences requires 15 credits and must include either BIOSC 302 or 303, 304 or 305 (or both); remaining credits must be selected from biochemistry, biological sciences, botany, genetics, or zoology courses numbered 300 or higher.

Business Administration

A minor in Business Administration requires ACCT 203 (or ACCT 201 and 202), ECON 200 (or ECON 211 and 212), FIN 306, LAW 322, MGT 301 and MKT 301. (A student's curriculum may require ACCT 201 and 202 or ECON 211 and 212, rather than the broader survey courses. In these cases, the student has already satisfied the accounting and economics requirement.)

Chemistry

A minor concentration in Chemistry requires CH 101, 102, and 15 additional credits in Chemistry, at least nine of which must be at the 300 or 400 level, with the courses to be selected in consultation with the Department of Chemistry.

Cluster

The Cluster minor concentration is designed to allow students a somewhat wider choice of course materials than is possible with the conventional sub-

ject-matter minor. The general requirement for the Cluster minor is 15 credits in courses numbered higher than 300, except where noted differently chosen according to one of the plans listed below. Courses within the student's major area may not be included in the Cluster minor.

Group I—Social Sciences: anthropology, economics, geography, history, political science, psychology, sociology.

Group II—Administration: accounting, economics, finance, law, management, management science, marketing.

Group III—Life Sciences¹: biochemistry, biological science, botany, genetics, microbiology, zoology.

Group IV—Physical Sciences¹: chemistry, geology, physics.

¹No course in the 100 series is acceptable toward the Cluster minor and not more than six hours in the 200 series are acceptable.

Communications

A minor concentration in Communications requires 18 credits distributed as follows:

General Communications Option—ENGL 231, 312, and either SPCH 360 or 361, PHIL 102, and six elective credits.

Advertising Option—APEC 351, ENGL 231 or 304, G C 104, PSYCH 330, and six elective credits.

Commerce Option—AP EC 351 or THRD 468, ENGL 231 or 304, SPCH 360 or 361, MGT 301 and six elective credits.

Politics Option—ENGL 312 and either SPCH 360 or 361, P O SC 341, 443, and six elective credits.

Elective credits are approved by the Chair of the Department of English or his/her representative.

Computer Science

A minor in Computer Science requires CP SC 102 or 210, 231, 340, plus at least six credits chosen from 300 level or higher computer science courses.

Early Intervention Specialist

The following coursework is required to meet the credentialing standard for Early Intervention Specialist: ED F 336, ED F 334 or PSYCH 340, ED SP 402, 468, HLTH 410, 411, 420/620 and SOC 311.

Economics

A minor concentration in Economics requires ECON 314, 315, and nine additional credits from economics courses numbered 300 or higher.

Elementary Education

A minor in Elementary Education requires ED 100, 461, ED F 301, 302, 334, and ED SP 402, plus one of the following: ED 451, 452, 487, or 488.

It is recommended that students planning to work toward certification in elementary education also take ED 401 during the semester they take ED 461.

English

A minor concentration in English requires 15 credits in English above the sophomore level, arranged as follows:

Group I—ENGL 411.

Group II—Three credits from ENGL 405, 406, 407, 408, 409, 410, 412, 413, 414, 415, 416, 417, 418.

Group III—Three credits from ENGL 422, 423, 424, 425.

Group IV—Six additional credits above the sophomore level, including at least three credits from the 400 level.

Department certification of proficiency in composition is required. (See discussion under major concentration in English.)

Entomology

A minor in Entomology requires ENT 301 and 12 credits of any other entomology courses at the 300 level or higher.

Environmental Science

A minor in Environmental Science requires EN SP 300, 400, and 12 credits from the following groups:

Group I—Science and engineering; at least six credits from these courses: AGRON 202, AGRON (AG E, E S E) 408, BIOSC 441, 443, CH 413, ENT (ENTOX) 430, E S E 401, 402, 430, 485, FOR 315.

Group II—Economics and resource management; at least three credits from these courses: APEC 403, AGRON 404, C R D 357, GEOG 101, 220, 103.

Group III—History, political science, philosophy, psychology, and ethics; at least three credits from these courses: C R P 405, HIST 321, 322, 323, 491, HUM 305, PHIL 324, 325, PSYCH 355, S T S 300.

Environmental Systems

Engineering

A minor in Environmental Systems Engineering requires at least 15 credits and must include E S E 401 or EN SP 200. Six credits must be from E S E 402, 410, 411, 430, 482, 484, or 485. Six credits must be from C E 342, CH 223, 411, 413, CH E 401, 450, EN SP 400, EN TOX 400, 430, GEOL 408, MICRO 305, 410.

Finance

A minor in Finance requires FIN 306 or 311, 312, 305, 308, and one 400-level Finance course or FIN 307.

Fine Arts

A minor in Fine Arts requires HUM 301¹, 302¹ and 15 credits from the following courses, of which at least nine credits must be earned in courses numbered 300 or higher, and no more than nine credits in any discipline selected from the following: A A H (all courses), ART (all courses), ENGL 345, 346, 357, 445, 446, HUM 305, 306, 309, L S 190, MUSIC (all courses), SPCH 369, SPCH (THEA) 363, THEA (all courses).

¹Students transferring from the College of Architecture may substitute DSIGN 151-152 for HUM 301, 302.

Food Science

A minor concentration in Food Science requires FD SC 214, 401 and seven additional credits in Food Science courses numbered 300 or higher.

Forest Products

A minor in Forest Products requires 15 credits which must include the following: FOR 441, 442, and 443; with the remaining credits being selected from the following: FOR 221, 341, 444, 445, 446, and 447.

Forest Resource Management

A minor in Forest Resource Management requires either of the following:

1. Credits from the following: FOR 305, 310, 315, and a minimum of six credits, selected with a forestry faculty advisor's approval, from any forestry course (for a total of 15 credits).
2. A formal program of study developed by the student and forestry advisor, containing a minimum of 15 credits of forestry courses. Nine credits must be at the 300 level or higher.

Geography

The Geography minor consists of GEOG 101 or 103 plus 15 credits of geography at the 200, 300 or 400 level. At least one 400-level geography course must be taken. One of the following courses may be taken as part of the 15-credit, upper-level requirements but may not be substituted for the required 400-level geography course: PRMT 430, R S (SOC) 401, 471.

Geology

A minor concentration in Geology requires GEOL 101 and 15 additional credits drawn from 300- and 400-level geology courses; at least one 400-level course must be included.

Health Science

A minor in Health Science requires HLTH 298 plus 12 additional credits drawn from the 300- and 400-level health courses; at least one 400-level course must be included.

History

A minor concentration in History requires 15 credits in history at the 300 and 400 level. Three credits at the 400 level must be included.

Horse Production

A minor concentration in Horse Production requires ADVSC 202, 301, 412 and eight credits from the following: ADVSC 205, 309, 310, 390, 405, 407.

Horticulture

A minor concentration in Horticulture requires HORT 101 and 12 additional credits of horticulture courses (excluding HORT 271, 408, 471), nine credits of which must be at the 300 level or higher.

International Politics

A minor in International Politics requires PO SC 102, 361 and 12 additional credits chosen from the list below, of which at least three must be chosen from Group I and at least three from Group II:
Group I—Comparative Politics—PO SC 371, 373, 471, 472, 475, 476, 477.
Group II—International Politics—PO SC 428, 457, 462, 463, 465.

With the approval of the Political Science department head, PO SC 310, 311, 379, and 468 may be applied to the requirements for the International Politics minor. Students majoring in Political Science cannot minor in International Politics.

Legal Studies

A minor in Legal Studies requires 15 credits at the 300-400 level at least six credits of which must be selected from Group I, at least six credits of which

must be selected from Group II, and the remaining three credits of which can be selected from either group at the student's option¹:

Group I—HIST 328, 329, 496, PHIL 343, PO SC 432, 433, 434, 435, SOC 390.

Group II—LAW 312, 313, 322, H322, 333, 401, 402, 405, 420, 429, 499.

¹Additional courses may be approved by a committee composed of a representative selected by the Dean of the College of Architecture, Arts and Humanities and a representative selected by the Dean of the College of Business and Public Affairs.

²Courses selected by students in BA curriculum for their major department to fulfill major requirements cannot also be used to satisfy requirements of this major.

Marketing

A minor concentration in Marketing requires MKT 301, 302, 426 or 428 or 429, and six additional credits in marketing.

Mathematical Sciences

A minor in Mathematical Sciences requires MTHSC 208 and 12 additional credits in mathematical sciences courses numbered 300 or higher.

Microbiology

A minor concentration in Microbiology requires MICRO 305 and eleven additional credits drawn from 400-level microbiology courses.

Modern Languages

A minor concentration in Modern Languages requires 15 credits in one modern language from courses at the 300 and 400 levels, including at least one course at the 400-level. In addition, a minor concentration in French requires FR 305.

Music

A minor concentration in Music requires MUSIC 151, 152, 205, 206, two credits in ensemble (MUSIC 361, 362, 363, 364, 365, 366, 367, 369). An additional eight credits must be selected from the following: MUSIC 210, 251, 252, 301, 305, 306, 311, 312, 315, 316, 321, 322, 351, 352, 404, 451, 452. A maximum of two additional ensemble courses may be included in these eight credits.

Natural Resource Economics

A minor in Natural Resource Economics requires AP EC 403 and C R D 357 and three courses selected from the following: AP EC 308, 352, 402, 425, 433, 452, APEC (C R D) 412, R S (SOC) 401.

Parks, Recreation and Tourism

Management

A minor in Parks, Recreation and Tourism Management requires PRMT 301 (preferred) or PRMT 101 and 15 credits taken in one of these options:

Community Leisure Services—PRMT 205, 321 and nine additional credits from PRMT 307, 400, 403, 421, 441.

Recreation Resource Management—PRMT 270, 330, 474 and six additional credits from PRMT 320, 403, 431.

Therapeutic Recreation—PRMT 311, and 12 additional credits in parks, recreation and tourism management, nine of which must be taken from PRMT 314, 315, 316, 318, 411, 412, 413.

Travel and Tourism—PRTM 342 and 12 additional credits from PRTM 343, 344, 349, 445, 446, either 430 or 447.

Philosophy

A minor concentration in Philosophy requires 18 credits in philosophy. These 18 credits may include one 100-level philosophy course (PHIL 101, 102, or 103), PHIL 401 or PHIL 402 must be included.

Physics

A minor concentration in Physics requires PHYS 122, 221 and 222, and nine additional credits in physics courses at the 300 level or higher.

Plant Pathology

A minor concentration in Plant Pathology requires PL PA 401 and 12 credits from the following: any 300/400-level plant pathology courses, BIOSC 418, 425, 426, 1 P M 401, MICRO 305.

Political Science

A minor concentration in Political Science requires PO SC 101 or 102 and 15 additional credits at the 300-400 level, nine of which must be selected from three different fields of political science as follows: *American Government*—PO SC 403, 405, 432, 442, 476, 477. *Comparative Politics*—PO SC 371, 373, 471, 475, 465. *International Politics*—PO SC 361, 428, 462, 463, 465.

Political Theory—PO SC 351, 352, 453.

Public Policy/Public Administration—PO SC 302, 321.

At least one 400-level course must be included. No more than a total of three credits from PO SC 310, 311, and 312 may be applied to the requirements for a Political Science minor.

Poultry Science

A minor concentration in Poultry Science requires P S 201 and 12 additional credits from P S 101, 323, 355, 400, 402, 451, 453, 458, 460.

Psychology

A minor concentration in Psychology requires PSYCH 201, and 205 or 210 (except for Sociology majors) and 15 credits from 300- and 400-level psychology courses. At least one 400-level course must be included.

Religion

A minor in Religion requires REL 101 plus 15 credits in religion courses numbered above 300, including at least one course numbered above 400. PHIL 303 and SOC 432 may be included in the minor, provided that they are not counted towards meeting requirements for a major in those fields.

Science and Technology in Society

A minor in Science and Technology in Society requires S T S 300 plus 15 additional credits, at least six of which must be on the 400 level. No course that is used to meet the requirements of a disciplinary major may also be used to meet the Science and Technology in Society minor requirements. See advisor for list of approved courses.

Secondary Education

A minor in Secondary Education requires ED 100, 498, ED F 301, 302, 335, and ED SP 402, plus one of the following: ED 424, 425, 426, 427, or 428.

Sociology

A minor concentration in Sociology requires SOC 201 and 15 credits from sociology and rural sociology courses numbered 300 or higher. At least one 400-level course must be included.

Spanish-American Area Studies

A minor concentration in Spanish-American Area Studies requires the equivalent of SPAN 202, plus 15 credits distributed as follows: six credits from HIST 340, 341, 342, 440; six credits from SPAN 305, 308, 311, 411; three credits from AGRIC 301, 401, ECON 410, PO SC 475.

Speech and Communication Studies

A minor in Speech and Communication Studies requires SPCH 150 and 12 additional hours in Speech, nine of which must be at the 300/400 level. Three hours at the 400 level must be included.

Textiles

A minor in Textiles requires 15 credits from the following: TEXT 201, 202, 460, and any other approved textile course such as TEXT 308, 314, 416, 420, 426, 428, 440, 470, 471, 472, 475, 476.

Theatre

A minor concentration in Theatre requires THEA 210, three credits of dramatic literature and history (ENGL 404, 410, 411, 412, 430, THEA 315, 316 or 317), and 12 credits of production and playwriting (THEA 275, 375, 376, 377, 476 and 477, THEA (ENGL) 347, 447).

Women's Studies

A minor in Women's Studies requires 15 credits on the 300 and 400 level, distributed as follows:

Group I—Six credits: W S 301 and 498.
Group II—Six credits chosen from core courses: ENGL 380, 436, HIST 318, PSYCH 308, SOC 461, and any additional courses approved for Group II.

Group III—The final three credits may be earned by taking any approved Women's Studies minor course.

Courses selected in Groups II and III must represent at least two disciplines. No course that is used to meet the requirements of a disciplinary major may also be used to meet the Women's Studies minor requirements. The courses for this minor are to be scheduled in consultation with the appropriate advisors. The Women's Studies advisor will provide all affected advisors with a list of approved courses prior to registration.

Writing

A minor in writing requires 15 credits as follows: *Business and Technical Option*—AP EC 351 or G C 104, CP SC 120, ENGL 304 or 314, 490, 495.

Journalism Option—ENGL 231, 333, 334, 335; one of the following electives: AP EC 351, CP SC 120, G C 104, ENGL 217, 304, 312, 314, THRD

468, PHIL 102, SPCH 250, 260, and any course approved by the Chair of the English Department: *Writing Pedagogy Option*—ENGL 312, 400, 448, 485; elective (three credits), any 300- or 400-level writing course offered by the Department of English.

Creative Writing Options

Drama—THEA (ENGL) 347, 447 (six credits), ENGL 430, and one of the following electives: ENGL 312, 410, 411.

Fiction—ENGL 345, 445 (six credits), 432, and one of the following electives: ENGL 312, 418, 425, 426.

Poetry—ENGL 346, 446 (six credits), 431, and one of the following electives: ENGL 312, 413, 416, 417.

SECOND BACCALAUREATE DEGREE

To complete a second baccalaureate degree, a student must complete a minimum of 30 semester hours at Clemson in addition to the greater number of hours required for either degree and satisfy all course and grade requirements for the second degree.

DOUBLE MAJOR

A student in a Bachelor of Arts degree program may be awarded a single baccalaureate degree with a double major. The two majors may be within a single college or may involve two colleges, but are limited to Bachelor of Arts degree programs.

GRADUATE DEGREES

Programs leading to graduate degrees are available in five colleges—Agriculture, Forestry and I Sciences; Architecture, Arts and Humanities; Business and Public Affairs; Engineering and Science and Health, Education and Human Development.

One hundred and ten graduate degree programs are offered. The degrees of Doctor of Philosophy, Doctor of Education, Education Specialist, Master of Arts, Master of Science, Master of Agricultural Education, Master of Agriculture, Master of Architecture, Master of Business Administration, Master of City and Regional Planning, Master of Construction Science and Management, Master of Education, Master of Engineering, Master of Fine Arts, Master of Forest Resources, Master of Health Administration, Master of Human Resource Development, Master of Industrial Education, Master of Parks, Recreation and Tourism Management, Master of Professional Accountancy, and Master of Public Administration are awarded to students who satisfactorily complete prescribed graduate programs.

For further information concerning advanced degrees see *The Graduate School Announcements* which may be obtained from the Graduate School Office.

COLLEGE OF AGRICULTURE, FORESTRY AND LIFE SCIENCES

The College of Agriculture, Forestry and Life Sciences offers a broad range of academic degree programs providing a sound knowledge base and technical expertise in the basic and applied sciences including the life sciences. The Bachelor of Science degree is available in 21 academic programs; the Bachelor of Arts is offered in Biological Sciences.

Preprofessional Health Studies non-degree programs are available in premedicine, predentistry, prephysical therapy, prepharmacy and preveterinary medicine. A bachelor's degree can be obtained by fulfilling the additional requirements specified by the University.

The undergraduate academic programs include Agricultural Economics with an option in Community and Rural Development; Agricultural Education; Agricultural Engineering; Agricultural Mechanization and Business; Agronomy with study areas in Agronomic Systems, Soil and Environment, and Weed Science; Animal, Dairy and Veterinary Sciences with emphasis in Production and Business, Meat and Dairy Foods, and Preveterinary and Science area (Animal Industries); Aquaculture, Fisheries and Wildlife Biology; Biochemistry; Biological Sciences; Entomology; Food Science; Forest Products; Forest Resource Management; Horticulture with an option in Turfgrass; Medical Technology; Microbiology with a Molecular Biology option; Packaging Science; Parks, Recreation and Tourism Management; Plant Pathology; and Poultry Science (Animal Industries).

Minors

The various disciplines in the College offer minors to students who wish to broaden their educational background and enhance their expertise. (See page 10 for minors.)

Honors Program

Students with a cumulative grade-point ratio of 3.4 and above are urged to consider enrolling in the Honors Program. The College offers Honors designed courses and an opportunity to do a research project under the direction of a faculty mentor in fulfillment of Senior Departmental Honors. For more information, contact the Honors Program office in Brackett Hall.

Scholarships

A wide range of scholarships is available to students who demonstrate excellence in their academic performance. Information on scholarships and financial aid can be obtained from specific departments in the College or from the Financial Aid Office in Sikes Hall.

AGRICULTURAL AND APPLIED ECONOMICS

Bachelor of Science

AGRICULTURAL ECONOMICS

The curriculum in Agricultural Economics emphasizes a strong background in economics with applications to agricultural and agriculturally-related businesses. In addition, courses are included in basic agricultural and biological sciences, liberal arts, and business. Students have twelve hours of free electives that may be used to further individual specialization or to broaden the educational experience.

Employment opportunities for graduates in Agricultural Economics are many and diverse. These include sales and promotional work for businesses, management positions in the farm loan departments of private banks or with cooperative farm credit agencies, public relations activities for various firms, market managers and directors, county agents, representatives of government agencies serving agriculture, and operators of numerous enterprises.

All students in the Agricultural Economics curriculum take a basic set of courses during their freshman and sophomore years. During the junior and senior years, each student concentrates in a particular study area. Five study areas are available: (1) Agricultural Business, (2) Economics, (3) International Trade and Development, (4) Production, and (5) Real Estate. Each student should select one of the five areas by the end of the sophomore year.

Freshman Year

First Semester

- 3 - AGRIC 103 Introduction to Animal Industries
- 3 - AGRIC 105 Agriculture and Society
- 3 - ENGL 101 Composition I
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 4 - Science Requirement¹

16

Second Semester

- 3 - AGRIC 104 Introduction to Plant Sciences
- 3 - AP EC 202 Agricultural Economics
- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 4 - Science Requirement¹

16

Sophomore Year

First Semester

- 3 - AP EC 302 Economics of Farm Management
- 3 - ECON 212 Principles of Macroeconomics
- 3 - Accounting Requirement²
- 6 - Humanities Requirement^{3,4}
- 3 - Elective

18

Second Semester

- 3 - AP EC 308 Quantitative Applied Economics
- 3 - AP EC 309 Econ. of Agricultural Marketing
- 3 - EX ST 301 Introductory Statistics
- 3 - Accounting Requirement²
- 3 - Oral Communication Requirement⁵
- 3 - Elective

18

Junior Year

First Semester

- 3 - ECON 314 Intermediate Microecon. Theory
- 3 - EX ST 462 Statistics Applied to Economics
- 3 - R S 301 Rural Sociology or
- 3 - R S (SOC) 359 The Community
- 3 - Study Area⁶
- 3 - Writing Intensive Requirement⁷

15

Second Semester

- 3 - AP EC 420 World Agricultural Trade or
- 3 - AP EC 460 Agricultural Finance
- 3 - ECON 302 Money and Banking or
- 3 - ECON 315 Intermed. Macroecon. Theory
- 3 - LAW 312 Commercial Law or
- 3 - LAW 322 Legal Environment of Business
- 6 - Study Area⁶
- 3 - Elective

18

Senior Year

First Semester

- 3 - AP EC 402 Production Economics
- 3 - AP EC (AGRON) 426 Cropping Systems Analysis
- 3 - AP EC 452 Agricultural Policy
- 3 - Study Area⁶
- 3 - Elective

15

Second Semester

- 3 - AP EC 456 Prices
- 6 - Study Area⁶
- 6 - Elective

15

131 Total Semester Hours

¹See General Education Requirement D.

²Two-semester sequence: ACCT 201 and 202, or 203 and 307.

³See General Education Requirement E.1.

⁴See General Education Requirement E.2.

⁵See General Education Requirement A.2.

⁶A study area should be selected by the end of the sophomore year in consultation with advisor. Select 18 credits from one of the following:

Agricultural Business—MGT 301, 307, MKT 301, and nine credits from a department approved list. (See advisor.)

Economics—ECON 430, MTHSC 207, 210, and nine credits from a department approved list. (See advisor.)

International Trade and Development—Six credits of AP EC 490 or two courses of the same foreign language, ECON 310 or 412, and nine credits from a department approved list. (See advisor.)

Production—Eighteen credits from a department approved list. (See advisor.)

Real Estate—AP EC 313, 413, FIN 307, 417, and six credits from a department approved list. (See advisor.)

⁷See General Education Requirement A.3.

AGRICULTURAL AND APPLIED ECONOMICS

Bachelor of Science

COMMUNITY AND RURAL DEVELOPMENT

The Community and Rural Development curriculum is designed to provide students with knowledge to deal with local, national, and international development issues. Students learn about natural and human resources, and basic principles in several disciplines. Associations between natural resources and social, economic, and political institutions are studied. Students receive practical training, and internships are available to complement the coursework in this curriculum.

A bachelor's degree with a major in Community and Rural Development will qualify students for employment with local, state, regional, federal and international agencies; with utilities, cooperative extension services, private businesses, research consulting firms, and financial institutions. This major also provides an excellent background for professional or graduate study in several disciplines.

Freshman Year

First Semester

- 3 - AGRIC 105 Agriculture and Society
- 3 - ENGL 101 Composition I
- 3 - GEOG 101 Introduction to Geography *or*
3 - GEOG 220 Historical Geography
- 3 - MTHSC 101 Introduction to Probability
- 4 - Science Requirement¹

16

Second Semester

- 3 - ENGL 102 Composition II
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 3 - Computer Skills Requirement²
- 3 - Humanities Requirement³
- 4 - Science Requirement¹

16

Sophomore Year

First Semester

- 3 - AG M 301 Soil and Water Conservation *or*
4 - AGRON 202 Soils
- 3 - AGRIC 301 International Agriculture
- 3 - AP EC 202 Agricultural Economics
- 3 - EX ST 301 Introductory Statistics
- 3 - Literature Requirement³

15-16

Second Semester

- 3 - ACCT 201 Accounting Concepts 1
- 3 - ECON 212 Principles of Macroeconomics
- 3 - PO SC 103 Intro. to Govern. and Politics *or*
3 - PO SC 102 Introduction to Global Issues
- 3 - R S 301 Rural Sociology
- 3 - SPCH 250 Public Speaking
- 3 - Writing Intensive Requirement²

18

Junior Year

First Semester

- 3 - ECON 314 Intermediate Microeconomics
- 3 - EX ST 462 Statistics Applied to Economics
- 3 - RS (SOC) 359 The Community
- 3 - Social Science Requirement⁴
- 3 - Specialization³
- 2 - Elective

17

Second Semester

- 3 - AP EC 352 Public Finance
- 3 - C R D 357 Natural Resources Economics
- 3 - R S (SOC) 401 Human Ecology
- 3 - Commerce and Industry Requirement⁶
- 3 - Specialization³
- 2 - Elective

17

Senior Year

First Semester

- 2 - C R D (AP EC) 411 Regional Impact Analysis
- 3 - R S (SOC) 471 Demography
- 3 - Advanced Social Science Requirement⁷
- 3 - Planning Requirement⁸
- 3 - Specialization³
- 3 - Elective

17

Second Semester

- 3 - AP EC 403 Land Economics
- 3 - C R D (AP EC) 412 Spatial Competition and Rural Development
- 3 - C R D (AP EC) 491 Internship
- 5 - Specialization³
- 3 - Elective

17

133-134 Total Semester Hours

¹A two-semester sequence in the same physical or biological science, each including a laboratory.

²See General Education Requirements.

³ENGL 202, 208, 209.

⁴Select from 200- or 300-level courses in geography, history, political science, psychology, sociology.

⁵See advisor for available specialization and course requirements.

⁶ECON 302, 315, 410, MGT 301, 305, 307, MKT 301.

⁷Select from 300- or 400-level courses in geography, history, political science, psychology, sociology.

⁸C R P 411, 415, 472.

AGRICULTURAL EDUCATION

Bachelor of Science

Agricultural Education provides broad preparation in agricultural sciences and professional education, including communications and human-relations skills. In addition to required courses, students may elect minor study in agricultural management, mechanization, horticulture, forestry, or production agriculture. Students in other departments within the College may minor in Agricultural Education and be certified to teach when they meet the minimum requirements.

The Bachelor's degree prepares students for professional education positions in the mainstream of agriculture including teaching, cooperative extension service, and governmental agricultural agencies such as SCS, FmHA, or ASCS. This degree prepares students for other forms of educational work such as agricultural missionary, public relations, and positions as training officers in agricultural industry, both domestic and international.

Freshman Year

First Semester

- 3 - AGRIC 103 Introduction to Animal Industries
- 4 - BIOL 103 General Biology I
- 3 - ENGL 101 Composition I
- 3 - Computer Skills Requirement¹
- 3 - Mathematics Requirement²

16

Second Semester

- 1 - AG ED 100 Orientation and Field Experience
- 3 - AGRIC 104 Introduction to Plant Sciences
- 4 - BIOL 104 General Biology II
- 3 - ENGL 102 Composition II
- 3 - Mathematics Requirement²
- 1 - Elective

15

Sophomore Year

First Semester

- 3 - AG ED 201 Intro. to Agricultural Education
- 3 - AG M 205 Principles of Farm Shop *or*
3 - AG M 206 Agricultural Mechanization
- 4 - CH 101 General Chemistry *or*
4 - CH 105 Beg. Gen. and Organic Chemistry
- 3 - HIST 322 History of Technology *or*
3 - HIST 323 History of American Technology
- 3 - Humanities Requirement³

16

Second Semester

- 3 - AP EC 202 Agricultural Economics
- 4 - CH 102 General Chemistry *or*
4 - CH 106 Beg. Gen. and Organic Chemistry
- 3 - HORT 208 Landscape Appreciation
- 3 - Literature Requirement⁴
- 3 - Elective

16

Junior Year

First Semester

- 3 - AG M 301 Soil and Water Conservation *or*
3 - AG M 452 Farm Power
- 4 - AGRON 202 Soils
- 3 - AP EC 302 Economics of Farm Management
- 4 - ENT 301 General Entomology
- 6 - Minor⁵

20

Second Semester

- 3 - ADVSC 301 Feeds and Nutrition
- 3 - ED F 302 Educational Psychology
- 3 - SPCH 250 Public Speaking
- 6 - Minor⁵
- 3 - Writing Intensive Requirement¹

18

Senior Year**First Semester**

- 1 - AG ED 400 Supervised Field Experience II
- 1 - AG ED 423 Curriculum
- 2 - AG ED 425 Teaching Agricultural Mechanics
- 3 - FOR 305 Elements of Forestry
- 3 - PL PA 401 Plant Pathology
- 3 - Minor³
- 4 - Elective

18

Second Semester

- 3 - AG ED 401 Methods in Agricultural Educ.
- 12 - AG ED 406 Directed Teaching
- 3 - Elective

18

137 Total Semester Hours

¹See General Education Requirements.²See General Education Requirements. MTHSC 115, 116, 215, 216 may not be included.³See Humanities section under General Education Requirements.⁴ENGL 202, 203, 204, 205, 206, 207, 208, 209.⁵See advisor for available minor areas and course requirements.**AGRICULTURAL
ENGINEERING****Bachelor of Science**

Graduates in Agricultural Engineering are well-equipped to apply engineering to many functions affecting the well-being of mankind. They have broad training in mathematics, physics, chemistry, and biological sciences as well as comprehensive coverage of the engineering sciences. Agricultural engineers are sought by industry and public service organizations primarily for their ability to apply engineering expertise to living systems and to the management of land and water resources. Specific areas of emphasis are Agricultural Production and Consumer Products Engineering, Biotechnology Engineering, Food Engineering, and Natural Resources Engineering.

This curriculum includes courses in such engineering sciences as mechanics, fluids, thermodynamics, electrical theory, instrumentation computing devices and systems analysis. Courses in the basic sciences appropriate to the areas of emphasis provide a foundation for engineering design and development and for the management of biological systems. In addition, important facets of energy conversion, research methods, use of economy and integrity in design and protection, modification, and control of the environment are included.

Graduate programs lead to the Master of Science, Master of Engineering, and Doctor of Philosophy degrees.

Employment opportunities for agricultural engineering graduates include design, research, production and sales with industry plus teaching, research, extension, and field engineering with governmental agencies. Agricultural engineers are also equipped for self-employment as consulting engineers or as owners of businesses providing engineering services and related products.

Freshman Year Program**First Semester**

- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 1 - ENGR 101 Introduction to Engineering
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Humanities/Social Science Requirement¹

15

Second Semester

- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 3 - ENGR 120 Engr. Problem Solving and Design
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I

17

¹See Policy on Humanities and Social Sciences for Engineering Curricula.²Note: Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)**AGRICULTURAL PRODUCTION-
CONSUMER PRODUCTS
ENGINEERING EMPHASIS AREA****Sophomore Year****First Semester**

- 2 - AG E 221 Surveying for Soil and Water Res.
- 2 - E G 209 Intro. to Engr./Comp. Graphics
- 3 - E M 201 Engineering Mechanics: Statics
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 3 - Elective

17

Second Semester

- 2 - AG E 214 Fabrication and Manufacturing Methods for Agricultural Systems
- 3 - E M 202 Engineering Mechanics: Dynamics
- 3 - ECON 211 Principles of Microeconomics or
 - 3 - ECON 200 Economic Concepts or
 - 3 - ECON 201 Principles of Economics¹
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - SPCH 250 Public Speaking
- 3 - Literature Requirement²

18

Junior Year**First Semester**

- 3 - AG E 356 Machine Operations for Agricultural and Biological Systems
- 2 - E C E 307 Basic Electrical Engineering
- 3 - E M 304 Mechanics of Materials
- 3 - M E 310 Thermodynamics and Heat Transfer
- 3 - Humanities/Social Science Requirement³
- 3 - Plant/Animal Science Requirement⁴

17

Second Semester

- 2 - AG E 322 Small Watershed Hydrology and Sedimentology
- 2 - AG E 333 Environ. Modification and Control for Agricultural and Biological Systems
- 2 - AG E 350 Microcomputer Controls in Biosys.
- 3 - AG E 362 Energy Conversion in Agricultural and Biological Systems

4 - AGRON 202 Soils

3 - E M 320 Fluid Mechanics or

3 - C E 340 Fluid Mechanics for Civil Engrs.

16

Senior Year**First Semester**

- 3 - AG E 416 Mech. Design for Ag. and Biol. Sys.
- 3 - AG E 431 Agricultural Structures and Environmental Design
- 3 - AG E 450 Instrumentation for Agricultural and Biological Systems
- 3 - I E 384 Engineering Economic Analysis
- 3 - Technical Requirement⁴
- 3 - Elective

18

Second Semester

- 2 - AG E 421 Engr. Systems for Soil Water Mgt.
- 3 - AG E 442 Properties and Processing of Biological Products
- 2 - AG E 471 Engineering Research and Mgt.
- 3 - Humanities/Social Science Requirement³
- 3 - Technical Requirement⁴
- 3 - Elective

17

135 Total Semester Hours

¹ECON 200 is terminal course. ECON 211 is the preferred prerequisite for upper level courses.²Choose three hours from Humanities/Social Policy list.³See Policy on Humanities and Social Sciences for Engineering Curricula.⁴See advisor.**BIOTECHNOLOGY
ENGINEERING EMPHASIS AREA****Sophomore Year****First Semester**

- 4 - CH 201 Survey of Organic Chemistry
- 2 - E G 209 Intro. to Engr./Comp. Graphics
- 3 - E M 201 Engineering Mechanics: Statics
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II

16

Second Semester

- 2 - AG E 214 Fabrication and Manufacturing Methods for Agricultural Systems
- 3 - BIOCH 301 General Biochemistry
- 1 - BIOCH 302 Molecular Biology Lab. I
- 3 - E M 202 Engineering Mechanics: Dynamics
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - Elective

16

Junior Year**First Semester**

- 2 - E C E 307 Basic Electrical Engineering
- 3 - E M 304 Mechanics of Materials
- 3 - M E 310 Thermodynamics and Heat Transfer
- 4 - MICRO 305 General Microbiology
- 3 - Humanities/Social Science Requirement¹
- 3 - Literature Requirement²

18

Second Semester

- 2 - AG E 333 Environ. Modification and Control for Agricultural and Biological Systems
- 2 - AG E 350 Microcomputer Controls in Biosys.
- 3 - AG E 362 Energy Conversion in Agricultural and Biological Systems
- 3 - AG E 430 Engr. Modeling of Biological Sys.
- 3 - E M 320 Fluid Mechanics or
- 3 - C E 340 Fluid Mechanics for Civil Engrs.
- 3 - SPCH 250 Public Speaking

16

Senior Year**First Semester**

- 3 - AG E 416 Mech. Design for Ag. and Biol. Sys.
- 3 - AG E 428 Biochemical Engineering
- 3 - AG E 450 Instrumentation for Agricultural and Biological Systems
- 4 - Advanced Biology Requirement¹
- 6 - Elective

19

Second Semester

- 2 - AG E 421 Engr. Systems for Soil Water Mgt.
- 3 - AG E 429 Appl. in Biotechnology Engineering
- 3 - AG E 442 Properties and Processing of Biological Products
- 2 - AG E 471 Engineering Research and Mgt.
- 3 - ECON 211 Principles of Microeconomics or
- 3 - ECON 200 Economic Concepts or
- 3 - ECON 201 Principles of Economics¹
- 3 - Humanities/Social Science Requirement¹
- 2 - Elective

18

135 Total Semester Hours

¹See Policy on Humanities and Social Sciences for Engineering Curricula.²Choose three hours from Humanities/Social Policy list.³Choose four hours from MICRO 412, 418; BIOSC 401/402, 475/476 or AN PH 301.⁴ECON 200 is terminal course. ECON 211 is the preferred prerequisite for upper level courses.

FOOD ENGINEERING EMPHASIS AREA

Sophomore Year**First Semester**

- 4 - CH 201 Survey of Organic Chemistry
- 2 - E G 209 Intro. to Engr./Comp. Graphics
- 3 - E M 201 Engineering Mechanics: Statics
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II

16

Second Semester

- 2 - AG E 214 Fabrication and Manufacturing Methods for Agricultural Systems
- 3 - BIOCH 301 General Biochemistry
- 1 - BIOCH 302 Molecular Biology Lab. I
- 3 - E M 202 Engineering Mechanics: Dynamics
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - Elective

16

Junior Year**First Semester**

- 3 - AG E 356 Machine Operations for Agricultural and Biological Systems
- 2 - E C E 307 Basic Electrical Engineering
- 3 - E M 304 Mechanics of Materials
- 3 - ECON 211 Principles of Microeconomics or
- 3 - ECON 200 Economic Concepts or
- 3 - ECON 201 Principles of Economics¹
- 3 - M E 310 Thermodynamics and Heat Transfer
- 3 - Literature Requirement²

17

Second Semester

- 2 - AG E 333 Environ. Modification and Control for Agricultural and Biological Systems
- 2 - AG E 350 Microcomputer Controls in Biosys.
- 3 - AG E 362 Energy Conversion in Agricultural and Biological Systems
- 3 - E M 320 Fluid Mechanics or
- 3 - C E 340 Fluid Mechanics for Civil Engrs.
- 4 - MICRO 305 General Microbiology
- 3 - SPCH 250 Public Speaking

17

Senior Year**First Semester**

- 3 - AG E 416 Mech. Design for Ag. and Biol. Sys.
- 3 - AG E 428 Biochemical Engineering
- 3 - AG E 450 Instrumentation for Agricultural and Biological Systems
- 4 - FD SC 401 Food Chemistry I
- 3 - Humanities/Social Science Requirement¹
- 3 - Elective

19

Second Semester

- 3 - AG E 429 Appl. in Biotechnology Engineering
- 3 - AG E 442 Properties and Processing of Biological Products
- 2 - AG E 471 Engineering Research and Mgt.
- 3 - Approved Emphasis Requirement⁴
- 3 - Humanities/Social Science Requirement¹
- 4 - Elective

18

135 Total Semester Hours

¹ECON 200 is terminal course. ECON 211 is the preferred prerequisite for upper level courses.²Choose three hours from Humanities/Social Policy list.³See Policy on Humanities and Social Sciences for Engineering Curricula.⁴Choose three hours from AG E 322, 364, 421, 431, 473.

NATURAL RESOURCES ENGINEERING EMPHASIS AREA

Sophomore Year**First Semester**

- 2 - AG E 221 Surveying for Soil and Water Res.
- 2 - E G 209 Intro. to Engr./Comp. Graphics
- 3 - E M 201 Engineering Mechanics: Statics
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 2 - Elective

16

Second Semester

- 2 - AG E 214 Fabrication and Manufacturing Methods for Agricultural Systems
- 3 - E M 202 Engineering Mechanics: Dynamics
- 3 - ECON 211 Principles of Microeconomics or
- 3 - ECON 200 Economic Concepts or
- 3 - ECON 201 Principles of Economics¹
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - SPCH 250 Public Speaking
- 3 - Literature Requirement²

18

Junior Year**First Semester**

- 3 - AG E 356 Machine Operations for Agricultural and Biological Systems
- 2 - E C E 307 Basic Electrical Engineering
- 3 - E M 304 Mechanics of Materials
- 3 - M E 310 Thermodynamics and Heat Transfer
- 4 - Biological Science Requirement³
- 3 - Humanities/Social Science Requirement⁴

18

Second Semester

- 2 - AG E 322 Small Watershed Hydrology and Sedimentology
- 2 - AG E 333 Environ. Modification and Control for Agricultural and Biological Systems
- 2 - AG E 350 Microcomputer Controls in Biosys.
- 3 - AG E 362 Energy Conversion in Agricultural and Biological Systems
- 4 - AGRON 202 Soils
- 3 - E M 320 Fluid Mechanics or
- 3 - C E 340 Fluid Mechanics for Civil Engrs.

16

Senior Year**First Semester**

- 3 - AG E 416 Mech. Design for Ag. and Biol. Sys.
- 3 - AG E 431 Agricultural Structures and Environmental Design
- 3 - AG E 450 Instrumentation for Agricultural and Biological Systems
- 3 - Approved Engineering Requirement⁵
- 3 - Science Requirement⁶
- 3 - Elective

18

Second Semester

- 2 - AG E 364 Agricultural Waste Mgt. Systems
- 2 - AG E 421 Engr. Systems for Soil Water Mgt.
- 2 - AG E 471 Engineering Research and Mgt.
- 3 - Humanities/Social Science Requirement⁴
- 3 - Technical Requirement⁷
- 5 - Elective

17

135 Total Semester Hours

¹ECON 200 is terminal course. ECON 211 is the preferred prerequisite for upper level courses.²Choose three hours from Humanities/Social Policy list.³Choose four hours from BIOL 103, 104, 110, BIOSC 401, 402, either MICRO 205 or 305.⁴See Policy on Humanities and Social Sciences for Engineering Curricula.⁵See advisor.⁶Choose three hours from BIOCH 301, CH 201, GEOL 101, AGRIC 440 or from Biological Science Requirement.⁷Choose three hours from listed Biological Science, Science, or Approved Engineering Requirements.

AGRICULTURAL MECHANIZATION AND BUSINESS

Bachelor of Science

The major in Agricultural Mechanization and Business is designed to provide an educational program for undergraduate students who desire training in areas which are relevant to dynamic agricultural enterprise. It is organized with strength in both business management and technical support of agriculture and agribusiness. In order to produce an individual who is well rounded and capable of communicating, the curriculum includes courses in the humanities, social sciences, English composition, and public speaking.

The graduate in agriculture with a major in Agricultural Mechanization and Business finds meaningful and remunerative employment in a variety of situations directly and indirectly related to agricultural production, processing, marketing, and the many services connected therewith.

By completing this curriculum, the graduate will have fulfilled the requirements for an Agricultural Business Management minor and will be so noted on the transcript.

Freshman Year

First Semester

- 1 - AG M 101 Intro. to Mechanization and Bus.
- 3 - AGRIC 103 Introduction to Animal Industries
- 4 - BIOL 103 General Biology I
- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 3 - Mathematics Requirement¹

18

Second Semester

- 3 - AGRIC 104 Introduction to Plant Sciences
- 4 - BIOL 104 General Biology II
- 4 - CH 102 or 112 General Chemistry
- 3 - ENGL 102 Composition II
- 3 - Mathematics Requirement¹

17

Sophomore Year

First Semester

- 3 - AG M 205 Principles of Farm Shop
- 3 - AP EC 202 Agricultural Economics
- 4 - PHYS 207 General Physics I
- 3 - Computer Skills Requirement²
- 3 - Literature Requirement³

16

Second Semester

- 3 - ACCT 201 Accounting Concepts I
- 3 - AG M 206 Agricultural Mechanization
- 3 - AG M 303 Calculations for Mechanized Agric.
- 2 - E G 209 Intro. to Engr./Comp. Graphics
- 4 - PHYS 208 General Physics II
- 3 - Social Science Requirement⁴

18

Junior Year

First Semester

- 3 - AG M 301 Soil and Water Conservation
- 3 - AG M 406 Mechanical and Hydraulic Systems
- 3 - AP EC 302 Economics of Farm Management
- 3 - Social Science Requirement⁴
- 3 - Minor Requirement¹
- 3 - Elective

18

Second Semester

- 4 - AGRON 202 Soils
- 3 - AP EC 309 Econ. of Agricultural Marketing
- 3 - SPCH 250 Public Speaking
- 3 - Humanities Requirement⁶
- 3 - Writing Intensive Requirement²

16

Senior Year

First Semester

- 3 - AG M 402 Drainage, Irrig. and Waste Mgt.
- 3 - AG M 452 Farm Power
- 3 - AG M 460 Farm and Home Utilities
- 1 - AG M 472 Seminar
- 3 - AP EC 319 Agribusiness Management
- 3 - Minor Requirement¹

16

Second Semester

- 1 - AG M 401 Environmental Control for Plants and Animals
- 2 - AG M 403 Structures for Plants and Animals
- 3 - AG M 408 Equipment Sales and Service
- 3 - Agriculture Requirement⁷
- 7 - Elective

16

135 Total Semester Hours

¹A minimum of six credits to be selected from MTHSC 102, 106, EX ST 301 or MTHSC 101.

²See General Education Requirements.

³ENGL 202, 203, 204, 205, 206, 207, 208, 209.

⁴ED F 302, GEOG 101, 301, 302, HIST 101, 102, 172, 173, PO SC 101, PSYCH 201, SOC 201, 401, or any AP EC and R S courses.

⁵Select from Agricultural Business Management minor list.

⁶See General Education Requirements Humanities List.

⁷Select from all courses in the College of Agriculture, Forestry and Life Sciences.

AGRONOMY

Bachelor of Science

Agronomy is the branch of agriculture that deals with the theory and practice of field-crop production and soil management. The two major components of agronomy are crop science and soil science. Both involve the application of basic sciences such as botany, biochemistry, chemistry, genetics, mathematics, microbiology, and physics to food and fiber production and to solving environmental problems. On the agricultural side, agronomic crops account for the bulk of the primary food production for the world's population. Career opportunities for agronomy majors exist in biotechnology, environmental sciences, international agriculture, the dynamic high-tech world of agriculture as well as in traditional agriculture.

The degree in agronomy can be tailored to a job in industry, government, or business, depending on the student's career objectives. The degree can also be a stepping stone to graduate school and a career in research. Because the agronomy curriculum is a combination of basic and applied sciences, it provides flexibility and marketability.

Students majoring in Agronomy will select from three study areas: Agronomic Systems, Soil and Environment, and Weed Science. Students wishing to minor in Agronomy must satisfy the requirements as described in the Minors section.

AGRONOMIC SYSTEMS STUDY AREA

This study area provides a comprehensive agronomy curriculum which can prepare the student for a career in crop consulting, extension education, farm management, and industries requiring a knowledge of agricultural or managed ecosystems. It will also prepare the student for graduate work in one of the crop-related areas such as crop physiology, plant breeding and genetics, crop management, plant-soil-environment relationships, and soil fertility.

Freshman Year

First Semester

- 3 - AGRIC 103 Introduction to Animal Industries
- 1 - AGRON 100 Introduction to Agronomy
- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 3 - MTHSC 102 Intro. to Math. Analysis *or*
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Social Science Requirement¹

17-18

Second Semester

- 3 - AGRIC 104 Introduction to Plant Sciences
- 3 - AP EC 202 Agricultural Economics
- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 3 - EX ST 301 Introductory Statistics *or*
- 4 - MTHSC 108 Calculus of One Var. II *or*
- 3 - MTHSC 207 Multivariable Calculus

16-17

Sophomore Year

First Semester

- 4 - AGRON 202 Soils
- 4 - BIOL 103 General Biology I
- 3 - CH 223 Organic Chemistry *and*
- 1 - CH 227 Organic Chemistry Lab. *or*
- 3 - BIOCH 210 Elem. Biochemistry *and*
- 1 - BIOCH 211 Elem. Biochemistry Lab.
- 3 - Literature Requirement²
- 3 - Elective

18

Second Semester

- 3 - BIOSC 205 Plant Form and Function
- 1 - BIOSC 206 Plant Form and Function Lab.
- 4 - PHYS 200 Introductory Physics
- 3 - Computer Skills Requirement¹
- 3 - Humanities Requirement¹
- 3 - Elective

17

Junior Year**First Semester**

- 3 - AGRON (AP EC) 426 Cropping Syst. Analysis
- 3 - BIOSC 401 Plant Physiology
- 1 - BIOSC 402 Plant Physiology Lab.
- 4 - GEN 302 Introductory Genetics
- 3 - Crop Production Requirement³
- 3 - Pest Management Requirement⁴

17

Second Semester

- 3 - EN SP 200 Intro. to Environmental Science⁵
- 3 - SPCH 250 Public Speaking
- 6 - Agronomy Requirement⁶
- 3 - Crop Production Requirement³
- 3 - Pest Management Requirement⁴

18

Senior Year**First Semester**

- 1 - AGRON 455 Seminar
- 3 - ENGL 314 Technical Writing
- 3 - Agronomic Specialty Requirement⁷
- 5 - Agronomy Requirement⁶
- 4 - Elective

16

Second Semester

- 3 - AGRON 452 Soil Fertility Management³
- 3 - Agronomic Specialty Requirement⁷
- 3 - Agronomy Requirement⁶
- 6 - Elective

15

134-136 Total Semester Hours

¹See General Education Requirements.²ENGL 202, 203, 204, 205, 206, 207, 208, 209.³Select at least two of the following: AGRON 421, 422, 423.⁴Select at least two courses from the following: AGRON 407, ENT 301, PL PA 401.⁵BIOSC 441 may be substituted.⁶Select at least 14 credits from the following: AGRON 403, 405, 407, 421, 422, 423, 425, 446, 453, 475, 490, ENT 301, AGRON (HORT) 433, PL PA 401, and no more than three credits from AGRON 350 or 406.⁷Select at least two of the following: AGRON 405, 425, 490.**SOIL AND ENVIRONMENT STUDY AREA**

This study area gives students an understanding of soil as a natural resource and as a component of all terrestrial ecosystems. The student will learn how soils influence ecological processes above and below the ground. An understanding of these processes will enable the student to deal with traditional agricultural production issues as well as environmental management problems such as groundwater protection and the most appropriate use for a particular landscape. The student can aim toward a variety of special areas including soil biology, fertility, chemistry, physics, mineralogy, and morphology.

Freshman Year**First Semester**

- 1 - AGRON 100 Introduction to Agronomy
- 4 - BIOL 103 General Biology I
- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I¹

16

Second Semester

- 3 - AGRIC 104 Introduction to Plant Sciences
- 4 - BIOL 104 General Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 4 - MTHSC 108 Calculus of One Variable II¹

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry and
- 1 - CH 227 Organic Chemistry Lab.²
- 3 - GEOL 101 Physical Geology
- 1 - GEOL 103 Physical Geology Lab.
- 4 - PHYS 207 General Physics³
- 3 - Humanities Requirement⁴
- 3 - Social Science Requirement⁵

18

Second Semester

- 4 - AGRON 202 Soils
- 3 - CH 224 Organic Chemistry⁶
- 1 - CH 228 Organic Chemistry Lab.
- 3 - EN SP 200 Intro. to Environmental Science
- 4 - PHYS 208 General Physics⁷
- 3 - Literature Requirement⁸

18

Junior Year**First Semester**

- 3 - CH 313 Quantitative Analysis
- 2 - CH 315 Quantitative Analysis Lab.
- 3 - SPCH 250 Public Speaking
- 3 - Agronomy Crops Option⁹
- 3 - Computer Skills Requirement⁴
- 3 - Environmental Science Option¹⁰

17

Second Semester

- 3 - AGRON 452 Soil Fertility and Management
- 1 - AGRON 453 Soil Fertility Lab.
- 3 - AGRON 475 Soil Physics and Chemistry
- 3 - ENGL 314 Technical Writing
- 4 - MICRO 305 General Microbiology
- 3 - Environmental Science Option¹⁰

17

Senior Year**First Semester**

- 2 - AGRON 403 Soil Genesis and Classification
- 1 - AGRON 455 Seminar
- 3 - AGRON 490 Beneficial Soil Organisms in Plant Growth
- 3 - Environmental Science Option¹⁰
- 6 - Elective

15

Second Semester

- 3 - AGRON 408 Land Treatment of Wastewater
- 3 - BIOSC 401 Plant Physiology and
- 1 - BIOSC 402 Plant Physiology Lab. or
- 4 - GEN 302 Introductory Genetics
- 3 - EN SP 400 Studies in Environmental Science
- 3 - Social Science Requirement⁴
- 4 - Elective

17

135 Total Semester Hours

¹MTHSC 102 and 207 may be taken in lieu of MTHSC 106 and 108.²CH 201 may be substituted.³PHYS 122/124 may be substituted.⁴See General Education Requirements.⁵See General Education Requirements; must include three credits of agricultural and applied economics or economics.⁶BIOCH 210/211 may be substituted.⁷PHYS 221/223 may be substituted.⁸ENGL 202, 203, 204, 205, 206, 207, 208, 209.⁹AGRON 421, 422, 423, 426.¹⁰See advisor.**WEED SCIENCE STUDY AREA**

This study area is designed for those who have special interest in the agricultural chemical industry, in consulting where weed control is to be the area of specialization, and in research and extension education. Courses include plant physiology, pathology, entomology, and pesticide toxicology and provide a broad education in pest control.

The student interested in graduate work can plan for specialization in such areas as weed physiology, ecology, and control or herbicide technology.

Freshman Year**First Semester**

- 3 - AGRIC 103 Introduction to Animal Industries
- 1 - AGRON 100 Introduction to Agronomy
- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 3 - MTHSC 102 Intro. to Math. Analysis or
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Social Science Requirement¹

17-18

Second Semester

- 3 - AGRIC 104 Introduction to Plant Sciences
- 3 - AP EC 202 Agricultural Economics
- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition I
- 3 - EX ST 301 Introductory Statistics or
- 4 - MTHSC 108 Calculus of One Var. II or
- 3 - MTHSC 207 Multivariable Calculus

16-17

Sophomore Year**First Semester**

- 4 - AGRON 202 Soils
- 4 - BIOL 103 General Biology I
- 3 - CH 223 Organic Chemistry and
- 1 - CH 227 Organic Chemistry Lab. or
- 3 - BIOCH 210 Elementary Biochemistry and
- 1 - BIOCH 211 Elementary Biochemistry Lab.
- 3 - Literature Requirement²
- 3 - Elective

18

Second Semester

- 3 - BIOSC 205 Plant Form and Function
- 1 - BIOSC 206 Plant Form and Function Lab.
- 4 - PHYS 200 Introductory Physics
- 3 - Computer Skills Requirement¹
- 3 - Humanities Requirement¹
- 3 - Elective

17

Junior Year**First Semester**

- 3 - AGRON 421 Prin. of Field Crop Production
- 3 - BIOSC 406 Introductory Plant Taxonomy
- 1 - BIOSC 407 Introductory Plant Taxonomy Lab.
- 3 - EN SP 200 Intro. to Environmental Science³
- 4 - GEN 302 Introductory Genetics
- 3 - SPCH 250 Public Speaking

17

Second Semester

- 3 - AGRON 422 Major World Crops
- 3 - AGRON 452 Soil Fertility and Management
- 3 - AGRON 490 Beneficial Soil Organisms in Plant Growth
- 4 - ENT 301 General Entomology
- 3 - PL PA 401 Plant Pathology
- 3 - Agronomy Requirement⁴

19

Senior Year**First Semester**

- 3 - AGRON 407 Weed Ecology and Management
- 3 - AGRON (AP EC) 426 Cropping Sys. Analysis
- 3 - AGRON 446 Soil Management
- 1 - AGRON 455 Seminar
- 3 - BIOSC 401 Plant Physiology
- 1 - BIOSC 402 Plant Physiology Lab.

2 - Elective

16

Second Semester

- 3 - AGRON (HORT) 433 Integrated Weed Mgt.
- 3 - ENGL 314 Technical Writing
- 3 - ENT 420 Toxicology of Insecticides
- 3 - Agronomy Requirement⁴

3 - Elective

15

135-137 Total Semester Hours

¹See General Education Requirements.²ENGL 202, 203, 204, 205, 206, 207, 208, 209.³BIOSC 441 may be substituted.⁴AGRON 423, HORT 352, 412, 456.**ANIMAL INDUSTRIES****Bachelor of Science****ANIMAL, DAIRY AND VETERINARY SCIENCES**

The curriculum in Animal, Dairy and Veterinary Sciences is designed to provide students with a broad base of understanding of scientific principles and the application of these principles to scientific, technical, and business phases of livestock production, processing and marketing. Completion of general education requirements, basic sciences, applied sciences, and student-selected courses of personal interest prepares graduates well for successful careers. All students complete a common freshman year; the curriculum is then divided into five options: Dairy Production, Equine, Meat and Dairy Foods, Prevetterinary and Science, Production and Business. Each option includes specialized courses unique to students pursuing careers in those areas.

Many opportunities are available to Animal, Dairy and Veterinary Sciences graduates, including production, sales and marketing, business management, advertising, extension, meat and dairy industry, and teaching. Graduates in the Prevetterinary and Sciences Option also meet all requirements for admission to graduate school or the veterinary medicine programs for the University of Georgia and Tuskegee University.

Freshman Year Program**First Semester**

- 1 - ADVSC 100 Orientation to Animal, Dairy and Veterinary Sciences
- 3 - ADVSC 202 Introductory Animal Science
- 4 - BIOL 103 General Biology I or
- 5 - BIOL 110 Principles of Biology I
- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I

1 - Elective

16-17

Second Semester

- 1 - ADVSC 108 Animal and Dairy Sci. Tech.
- 4 - BIOL 104 General Biology II or
- 5 - BIOL 111 Principles of Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 3 - Mathematics Requirement¹

1 - Elective

16-17

¹MTHSC 102 or MTHSC 106 are required for Prevetterinary and Science Option.

DAIRY PRODUCTION OPTION**Sophomore Year****First Semester**

- 3 - ACCT 201 Accounting Concepts I or
- 3 - ACCT 203 Financial Accounting
- 1 - ADVSC 203 Dairy Science Techniques
- 3 - EX ST 301 Introductory Statistics
- 3 - Humanities Requirement¹
- 3 - Literature Requirement¹

4 - Elective

17

Second Semester

- 3 - AP EC 202 Agricultural Economics
- 4 - MICRO 305 General Microbiology
- 3 - SPCH 250 Public Speaking
- 3 - Computer Skills Requirement¹
- 3 - Plant or Soil Science Requirement²

16

Junior Year**First Semester**

- 4 - ADVSC 400 Dairy Processing I
- 4 - AN PH 301 Physiology and Anatomy of Domestic Animals
- 3 - AP EC 302 Econ. of Farm Management or
- 3 - AP EC 319 Agribusiness Management
- 3 - BIOCH 210 Elementary Biochemistry
- 1 - BIOCH 211 Elementary Biochemistry Lab.

3 - Elective

18

Second Semester

- 3 - ADVSC 301 Feeds and Nutrition
- 1 - ADVSC 306 Feeds and Nutrition Lab.
- 2 - ADVSC 311 Dairy Cattle Selection
- 4 - ADVSC 404 Dairy Cattle Feeding and Mgt.
- 3 - ADVSC 453 Animal Reproduction
- 3 - AP EC 309 Econ. of Agricultural Marketing

2 - Elective

18

Senior Year**First Semester**

- 2 - ADVSC 406 Seminars and Related Topics
- 3 - AP EC 351 Agricultural Sales, Merchandising and Advertising
- 3 - AP EC 409 Commodity Futures Markets
- 4 - GEN 302 Introductory Genetics
- 4 - Animal Production Requirement¹

16

Second Semester

- 3 - ADVSC 452 Animal Breeding
- 2 - ADVSC 461 Physiology of Lactation
- 3 - AP EC 460 Agricultural Finance
- 3 - MGT 307 Personnel Management
- 3 - Writing Intensive Requirement⁴

3 - Elective

17

134-136 Total Semester Hours

¹See General Education Requirements.²Select from AGRIC 104, AGRON 202 or 423.

³Select one course from ADVSC 401, 404, 408, 412, or P S 402. (Tuskegee University Veterinary School requires three credits of poultry science.) Remaining credits may include additional courses from preceding list or include ADVSC 310, 320, 330, 400, 402, 403, 407, 418, 455 or 461. A course already required in the curriculum option may not be used to satisfy this requirement.

⁴Select from ENGL 231, 304, 312, 314 or 316.**EQUINE OPTION****Sophomore Year****First Semester**

- 3 - ACCT 201 Accounting Concepts I or
- 3 - ACCT 203 Financial Accounting
- 2 - ADVSC 205 Light Horse Management
- 1 - ADVSC 210 Animal Science Techniques or
- 1 - ADVSC 203 Dairy Science Techniques
- 3 - EX ST 301 Introductory Statistics
- 3 - Humanities Requirement¹
- 3 - Literature Requirement¹

2 - Elective

17

Second Semester

- 3 - AP EC 202 Agricultural Economics
- 3 - SPCH 250 Public Speaking
- 3-4 - Animal Products Requirement² or
- 3-4 - Elective
- 3 - Computer Skills Requirements¹
- 3 - Plant or Soil Science Requirement³

15-16

Junior Year**First Semester**

- 4 - AN PH 301 Physiology and Anatomy of Domestic Animals
- 3 - AP EC 302 Econ. of Farm Management or 3 - AP EC 319 Agribusiness Management
- 3 - BIOCH 210 Elementary Biochemistry
- 1 - BIOCH 211 Elementary Biochemistry Lab.
- 3 - Agricultural Mechanization Requirement⁴
- 3-4 - Animal Products Requirement² or 3-4 - Elective

17-18

Second Semester

- 3 - ADVSC 301 Feeds and Nutrition
- 1 - ADVSC 306 Feeds and Nutrition Lab.
- 2 - ADVSC 309 Principles of Equine Evaluation
- 3 - ADVSC 310 Animal Disease and Sanitation
- 3 - ADVSC 453 Animal Reproduction
- 3 - AP EC 309 Econ. of Agricultural Marketing
- 2 - Elective

17

Senior Year**First Semester**

- 2 - ADVSC 406 Seminars and Related Topics
- 2 - ADVSC 407 Equine Theriogenology
- 3 - AP EC 351 Agricultural Sales, Merchandising, and Advertising
- 4 - GEN 302 Introductory Genetics
- 3 - Animal Production Requirement²
- 3-4 - Elective

17-18

Second Semester

- 4 - ADVSC 412 Horse Production
- 3 - ADVSC 452 Animal Breeding
- 3 - AP EC 460 Agricultural Finance
- 3 - MGT 307 Personnel Management
- 3 - Writing Intensive Requirement¹
- 2 - Elective

18

134-136 Total Semester Hours

¹See General Education Requirements.²Select either ADVSC 400, or ADVSC 353 and 355.³Select from AGRIC 104, AGRON 202 or 423.⁴Select from AG M courses as approved by advisor.

⁵Select one course from ADVSC 401, 404, 408, 412, or P S 402. (Tuskegee University Veterinary School requires three credits of poultry science.) Remaining credits may include additional courses from preceding list or include ADVSC 310, 320, 330, 400, 402, 403, 407, 418, 455 or 461. A course already required in the curriculum option may not be used to satisfy this requirement.

**MEAT AND DAIRY FOODS
OPTION****Sophomore Year****First Semester**

- 3 - ACCT 201 Accounting Concepts I or 3 - ACCT 203 Financial Accounting
- 1 - ADVSC 203 Dairy Science Techniques or 1 - ADVSC 101 Dairy Foods or 1 - ADVSC 210 Animal Science Techniques
- 4 - CH 201 Survey of Organic Chemistry
- 3 - Computer Skills Requirement¹

3 - Humanities Requirement¹**3 - Elective**

17

Second Semester

- 2 - ADVSC 353 Meats
- 1 - ADVSC 355 Meats Lab.
- 3 - AP EC 202 Agricultural Economics or 3 - ECON 211 Principles of Microeconomics
- 4 - PHYS 200 Introductory Physics
- 3 - SPCH 250 Public Speaking
- 4 - Elective

17

Junior Year**First Semester**

- 4 - ADVSC 400 Dairy Processing I
- 3 - ADVSC 418 Muscle Biology and Lean Meats
- 4 - AN PH 301 Physiology and Anatomy of Domestic Animals
- 3 - BIOCH 210 Elementary Biochemistry
- 1 - BIOCH 211 Elementary Biochemistry Lab.
- 2 - Elective

17

Second Semester

- 4 - ADVSC 402 Dairy Processing II
- 3 - EX ST 301 Introductory Statistics
- 4 - MICRO 305 General Microbiology or 4 - Nutrition Requirement²
- 3 - Literature Requirement¹
- 3 - Option³

17

Senior Year**First Semester**

- 2 - ADVSC 406 Seminars and Related Topics
- 3 - AP EC 351 Agricultural Sales, Merchandising, and Advertising
- 4 - MICRO 305 General Microbiology or 4 - Nutrition Requirement²
- 4 - Option³
- 4 - Elective

17

Second Semester

- 4 - MICRO 407 Food and Dairy Microbiology
- 4 - Animal Production Requirement⁴
- 3 - Writing Intensive Requirement¹
- 3 - Social Science Requirement¹
- 3 - Elective

17

134-136 Total Semester Hours

¹See General Education Requirements.²MICRO 305 is required. Nutrition Requirement—select either NUTR 401, or ADVSC 301 and 306.³Select from 300- and 400-level courses approved by advisor.

⁴Select one course from ADVSC 401, 404, 408, 412, or P S 402. (Tuskegee University Veterinary School requires three credits of poultry science.) Remaining credits may include additional courses from preceding list or include ADVSC 310, 320, 330, 400, 402, 403, 407, 418, 455 or 461. A course already required in the curriculum option may not be used to satisfy this requirement.

**PREVETERINARY AND
SCIENCE OPTION****Sophomore Year****First Semester**

- 1 - ADVSC 203 Dairy Science Techniques
- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 4 - PHYS 207 General Physics I
- 3 - Humanities Requirement¹
- 3 - Literature Requirement¹
- 1 - Elective

16

Second Semester

- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 3 - EX ST 301 Introductory Statistics
- 4 - PHYS 208 General Physics II
- 3 - Computer Skills Requirement¹
- 3 - Social Science Requirement¹

17

Junior Year**First Semester**

- 1 - ADVSC 210 Animal Science Techniques
- 4 - AN PH 301 Physiology and Anatomy of Domestic Animals
- 3 - BIOCH 301 General Biochemistry and 1 - BIOCH 302 Molecular Biology Lab. or 3 - BIOCH 210 Elementary Biochemistry and 1 - BIOCH 211 Elementary Biochemistry Lab.
- 4 - MICRO 305 General Microbiology
- 3 - SPCH 250 Public Speaking
- 2 - Elective

18

Second Semester

- 3 - ADVSC 301 Feeds and Nutrition
- 1 - ADVSC 306 Feeds and Nutrition Lab.
- 3 - ADVSC 453 Animal Reproduction
- 4 - GEN 302 Introductory Genetics
- 3 - Animal Production Requirement²
- 3 - Social Science Requirement¹

17

Senior Year**First Semester**

- 2 - ADVSC 406 Seminars and Related Topics
- 3 - NUTR 401 Fundamentals of Nutrition
- 3 - Animal Production Requirement²
- 3 - Animal Products Requirement³ or 3-4 - Elective
- 6 - Elective

17-18

Second Semester

- 3 - ADVSC 452 Animal Breeding
- 4 - Animal Production Requirement²
- 3 - Animal Products Requirement³ or 3-4 - Elective
- 3 - Writing Intensive Requirement¹
- 4 - Elective

17-18

134-136 Total Semester Hours

¹See General Education Requirements.²Select one course from ADVSC 401, 404, 408, 412, or P S 402. (Tuskegee University Veterinary School requires

three credits of poultry science.) Remaining credits may include additional courses from preceding list or include ADVSC 310, 320, 330, 400, 402, 403, 407, 418, 455 or 461. A course already required in the curriculum option may not be used to satisfy this requirement.

*Select either ADVSC 400, or ADVSC 353 and 355.

PRODUCTION AND BUSINESS OPTION

Sophomore Year

First Semester

- 3 - ACCT 201 Accounting Concepts *or*
- 3 - ACCT 203 Financial Accounting
- 1 - ADVSC 210 Animal Science Techniques *or*
- 1 - ADVSC 203 Dairy Science Techniques
- 3 - EX ST 301 Introductory Statistics
- 3 - Humanities Requirement¹
- 3 - Literature Requirement¹
- 4 - Elective

17

Second Semester

- 3 - AP EC 202 Agricultural Economics
- 3 - SPCH 250 Public Speaking
- 3 - Animal Products Requirement² *or*
- 3-4 - Elective
- 3 - Computer Skills Requirement¹
- 3 - Plant or Soil Science Requirement²

15-16

Junior Year

First Semester

- 4 - AN PH 301 Physiology and Anatomy of Domestic Animals
- 3 - AP EC 302 Econ. of Farm Management *or*
- 3 - AP EC 319 Agribusiness Management
- 3 - BIOCH 210 Elementary Biochemistry
- 1 - BIOCH 211 Elementary Biochemistry Lab.
- 3 - Agricultural Mechanization Requirement⁴
- 3 - Animal Products Requirement² *or*
- 3-4 - Elective

17-18

Second Semester

- 3 - ADVSC 301 Feeds and Nutrition
- 2 - ADVSC 302 Livestock Selection *or*
- 2 - ADVSC 311 Dairy Cattle Selection
- 1 - ADVSC 306 Feeds and Nutrition Lab.
- 3 - ADVSC 453 Animal Reproduction
- 3 - AP EC 309 Econ. of Agricultural Marketing
- 3 - Animal Production Requirement³
- 2 - Elective

17

Senior Year

First Semester

- 2 - ADVSC 406 Seminars and Related Topics
- 3 - AP EC 351 Agricultural Sales, Merchandising, and Advertising
- 3 - AP EC 409 Commodity Futures Markets
- 4 - GEN 302 Introductory Genetics
- 3 - Animal Production Requirement³
- 3 - Elective

18

Second Semester

- 3 - ADVSC 452 Animal Breeding
- 3 - AP EC 460 Agricultural Finance
- 3 - MGT 307 Personnel Management
- 4 - Animal Production Requirement³
- 3 - Writing Intensive Requirement¹
- 2 - Elective

18

134-136 Total Semester Hours

¹See General Education Requirements.

²Select either ADVSC 400, or ADVSC 353 and 355.

³Select from AGRIC 104, AGRON 202 or 423.

⁴Select from AG M courses as approved by advisor.

⁵Select one course from ADVSC 401, 404, 408, 412, or P S 402. (Tuskegee University Veterinary School requires three credits of poultry science.) Remaining credits may include additional courses from preceding list or include ADVSC 310, 320, 330, 400, 402, 403, 407, 418, 455 or 461. A course already required in the curriculum option may not be used to satisfy this requirement.

ANIMAL INDUSTRIES Bachelor of Science

POULTRY SCIENCE

This curriculum provides the student with a broad education in science and the humanities and specialized knowledge of the biology of the avian species and of the poultry industry. Avian science courses emphasize the nutrition, physiology, and pathology of domesticated and semi-domesticated birds. The environmental requirements for propagating the various species and for handling eggs and meat are covered. Minors provide for the student's specialized interests.

Job opportunities include supervisory positions with producers of eggs, broilers, turkeys, or game birds; technical representatives for feed manufacturers, vitamin and mineral suppliers, pharmaceutical and biological houses; extension specialists; teachers or researchers; salesmen or marketing specialists; quality control and poultry products technologists; government graders, inspectors or sanitarians.

Freshman Year

First Semester

- 4 - BIOL 103 General Biology I
- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 3 - MTHSC 102 Intro. to Mathematical Analysis¹
- 1 - P S 101 Avian Pets

15

Second Semester

- 3 - AGRIC 104 Introduction to Plant Sciences
- 4 - BIOL 104 General Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 3 - MTHSC 101 Introduction to Probability¹

17

Sophomore Year

First Semester

- 3 - AP EC 202 Agricultural Economics *or*
- 3 - ECON 200 Economic Concepts *or*
- 3 - ECON 211 Principles of Microeconomics
- 3 - BIOCH 210 Elementary Biochemistry²

- 1 - BIOCH 211 Elementary Biochemistry Lab.
- 1 - P S 102 Poultry Techniques
- 3 - P S 201 Poultry Husbandry
- 3 - Literature Requirement³
- 3 - Elective

17

Second Semester

- 4 - MICRO 305 General Microbiology
- 4 - PHYS 200 Introductory Physics⁴
- 3 - Agricultural Requirement⁵
- 3 - Computer Skills Requirement⁶
- 3 - Writing Intensive Requirement⁶

17

Junior Year

First Semester

- 4 - GEN 302 Introductory Genetics
- 3 - SPCH 250 Public Speaking
- 3 - Minor⁷
- 3 - Agricultural Requirement⁵
- 3 - Social Science Requirement⁴
- 2 - Elective

18

Second Semester

- 4 - AN PH 301 Physiology and Anatomy of Domestic Animals
- 3 - P S 355 Poultry Products Grading and Technology
- 2 - P S 402 Poultry Management
- 3 - Humanities Requirement⁶
- 6 - Minor⁷

18

Senior Year

First Semester

- 3 - MGT 301 Principles of Management
- 2 - P S 451 Poultry Nutrition
- 1 - P S 453 Poultry Nutrition Lab.
- 4 - P S 458 Avian Microbiology and Parasitology
- 3 - Minor⁷
- 3 - Elective

16

Second Semester

- 3 - P S 400 Avian Physiology
- 1 - P S 460 Seminar
- 3 - Minor⁷
- 9 - Elective

16

134 Total Semester Hours

¹Students may schedule six hours from EX ST 301, MTHSC 106, 108 pursuant to score on the College Board Achievement Test in Mathematics, Level II and as approved by advisor.

²Preveterinary students should also schedule CH 223, 227.

³ENGL 202, 203, 204, 205, 206, 207, 208, 209.

⁴Preveterinary students may substitute PHYS 207 for PHYS 200.

⁵AG E 333, 364, AG M 205, 301, ADVSC 202, 301, 310, 353, 355, 401, 402, 404, FD SC 201.

⁶See General Education Requirements.

⁷See advisor for list of minors.

⁸Select three hours from the following: GEOG 101, 220, 301, HIST 101, 102, 172, 173, PO SC 101, 102, 103, PSYCH 201, R S (SOC) 359, 401, 471, SOC 201, 202.

POULTRY BUSINESS STUDIES

Freshman Year

First Semester

- 3 - AGRIC 105 Agriculture and Society
- 4 - BIOL 103 General Biology I
- 3 - ENGL 101 Composition I
- 1 - P S 101 Avian Pets
- 3 - Mathematics Requirement¹
- 3 - Social Science Requirement²

17

Second Semester

- 3 - AGRIC 104 Introduction to Plant Science
- 4 - BIOL 104 General Biology II
- 3 - ECON 200 Economic Concepts
- 3 - ENGL 102 Composition II
- 3 - Computer Skills Requirement³

16

Sophomore Year

First Semester

- 3 - ACCT 201 Accounting Concepts I
- 3 - AP EC 202 Agricultural Economics
- 1 - P S 102 Poultry Techniques
- 3 - P S 201 Poultry Husbandry
- 3 - SPCH 250 Public Speaking
- 3 - Literature Requirement⁴

16

Second Semester

- 2 - P S 323 Poultry and Poultry Products Eval.
- 3 - Agriculture Requirement⁵
- 6 - Business Requirement⁶
- 3 - Humanities Requirement¹
- 3 - Elective

17

Junior Year

First Semester

- 3 - AP EC 302 Economics of Farm Management
- 3 - LAW 312 Commercial Law
- 2 - P S 451 Poultry Nutrition
- 3 - Agriculture Requirement⁵
- 3 - Business Requirement⁶
- 3 - Marketing Requirement⁷

17

Second Semester

- 3 - LAW 313 Commercial Law
- 3 - P S 355 Poultry Products Grading and Tech.
- 3 - Agriculture Requirement⁵
- 3 - Marketing Requirement⁷
- 3 - Writing Intensive Requirement¹
- 2 - Elective

17

Senior Year

First Semester

- 3 - AP EC 309 Econ. of Agricultural Marketing
- 3 - EX ST 301 Introductory Statistics
- 3 - MGT 301 Principles of Management
- 4 - P S 458 Avian Microbiology and Parasitology
- 1 - P S 460 Seminar
- 3 - Elective

17

Second Semester

- 3 - MGT 307 Personnel Management
- 3 - P S 400 Avian Physiology
- 2 - P S 402 Poultry Management
- 3 - Business Requirement⁶
- 6 - Elective

17

134 Total Semester Hours

¹Students may schedule three hours from MTHSC 101, 102, 106, 108 pursuant to score on the College Board Achievement Test in Mathematics, Level II and as approved by advisor.

²Select from history, political science, psychology, or sociology in the General Education Requirements.

³See General Education Requirements.

⁴ENGL 202, 203, 204, 205, 206, 207, 208, 209.

⁵ADVSC 202, 301, 310, 353, 355, 401, 402, 404, AG E 333, 364, AG M 205, 301, FD SC 201.

⁶Select from accounting, agricultural and applied economics, economics, finance, law, management, and marketing, as approved by advisor.

⁷AP EC 319, 351, 409, MKT 301, 302, 420, 422, 423, 424.

AQUACULTURE, FISHERIES AND WILDLIFE BIOLOGY

Bachelor of Science

Increased interest in conservation of natural resources and the environment and demand for seafood products and farm-raised fish has resulted in these areas becoming increasingly technical and requiring highly qualified wildlife and fisheries biologists. Greatest demands for graduates are in the areas of management, research, survey and regulatory positions with state and federal agencies; industrial research and quality control laboratories; conservation, recreational, and other public service agencies; private enterprises and fish farms.

The undergraduate curriculum provides a solid foundation for many career opportunities in the sciences. The curriculum is strong in basic and applied sciences, communication skills and the social sciences. Twenty-seven credit hours may be selected from emphasis areas and elective course offerings. Students select an emphasis area in either aquaculture and fisheries, wildlife management, or pre-veterinary medicine. These allow students to expand their knowledge of aquaculture, fisheries and wildlife or to broaden their background with courses in botany, zoology, and other sciences. In addition, six semester credits are available for field training with appropriate natural resource agencies. Students can satisfy coursework requirements for professional certification by The Wildlife Society and/or the American Fisheries Society.

Freshman Year

First Semester

- 4 - BIOL 103 General Biology I
- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 1 - W F B 101 Introduction to Aquaculture, Fisheries and Wildlife
- 1 - W F B 102 Methods of Aquaculture, Fisheries and Wildlife Biology

16

Second Semester

- 4 - BIOL 104 General Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 3 - Mathematical Sciences Requirement¹
- 3 - Elective

17

Sophomore Year

First Semester

- 4 - AGRON 202 Soils
- 4 - CH 201 Survey of Organic Chemistry or
 - 3 - BIOCH 210 Elementary Biochemistry and
 - 1 - BIOCH 211 Elem. Biochemistry Lab. or
 - 3 - CH 223 Organic Chemistry and
 - 1 - CH 227 Organic Chemistry Lab.
- 3 - W F B 350 Prin. of Fish and Wildlife Biology
- 3 - Bioscience Requirement²
- 3 - Elective

17

Second Semester

- 4 - PHYS 200 Introductory Physics³
- 3 - Bioscience Requirement²
- 3 - Computer Skills Requirement⁴
- 4 - Emphasis Area⁴
- 3 - Social Science Requirement¹

17

Junior Year

First Semester

- 3 - AG M 301 Soil and Water Conservation
- 3 - ENGL 314 Technical Writing
- 3 - W F B (BIOSC) 313 Conservation Biology
- 4 - Emphasis Area⁴
- 3 - Humanities Requirement¹
- 1 - Elective

17

Second Semester

- 4 - AN PH 301 Physiology and Anatomy of Domestic Animals
- 3 - EX ST 301 Introductory Statistics
- 4 - GEN 302 Introductory Genetics
- 3 - Social Science Requirement¹
- 3 - Wildlife and Fisheries Biology Requirement⁵

17

Senior Year

First Semester

- 3 - SPCH 250 Public Speaking
- 3 - Ecology Requirement⁶
- 4 - Emphasis Area⁴
- 3 - Fisheries Requirement⁷
- 3 - Wildlife Requirement⁵
- 1 - Elective

17

Second Semester

- 1 - W F B 499 Wildlife Biology and Fisheries Seminar
- 7 - Emphasis Area⁴
- 3 - Humanities Requirement¹
- 3 - Fisheries Requirement⁷
- 3 - Elective

17

135 Total Semester Hours

¹See General Education Requirements.

²Three credits from BIOSC 302 or 303; three credits from BIOSC 304 or 305.

³Preventerinary Medicine students must substitute PHYS 207.

⁴Nineteen credits from one of the three Emphasis Areas.

Aquaculture and Fisheries—Advisor approves courses selected from agricultural and applied economics; biological sciences; botany; community and rural development; environmental science and policy; entomology; environmental toxicology; forestry; geology; microbiology; philosophy; wildlife and fisheries biology; zoology, and other courses.

Wildlife Biology—Advisor approves courses selected from agricultural and applied economics; biological sciences; botany; community and rural development; environmental science and policy; entomology; environmental toxicology; forestry; geology; microbiology; wildlife and fisheries biology; philosophy; zoology and other courses.

Preventerinary Medicine—ADVSC 202, BIOCH 301, 302, CH 224, 228, MICRO 305, NUTR 401, PHYS 208 or courses approved by advisor (see Preventerinary Medicine).

⁵Six credits from W F B 412, 414, 462.

⁶Three credits from BIOSC 441, 443, 446.

⁷Six credits from W F B 416, 450, 451, 452.

BIOCHEMISTRY

Bachelor of Science

Biochemistry is the study of the molecular basis of life. To comprehend current biochemical information and make future contributions to our molecular understanding of life processes, students must obtain a broad background in biology and a firm foundation in chemistry, mathematics, and physics. This is the basis of the biochemistry curriculum.

The program provides an excellent educational background for professional school (medicine, dentistry, or veterinary medicine) and graduate school in biochemistry, molecular biology, or another biological science discipline. The graduate will find employment opportunities in the research and service programs of universities, medical schools, hospitals, research institutes, and industrial and government laboratories.

Freshman Year

First Semester

- 5 - BIOL 110 Principles of Biology I
- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I

16

Second Semester

- 5 - BIOL 111 Principles of Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 4 - MTHSC 108 Calculus of One Variable II

16

Sophomore Year

First Semester

- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.¹
- 4 - MICRO 305 General Microbiology
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 122 Physics with Calculus I
- 1 - PHYS 124 Physics Lab. I

16

Second Semester

- 3 - BIOCH 301 General Biochemistry
- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.¹
- 3 - PHYS 221 Physics with Calculus II
- 1 - PHYS 223 Physics Lab. II
- 3 - Literature Requirement²
- 3 - Social Science Requirement

17

Junior Year

First Semester

- 3 - BIOCH 431 Physical Approach to Biochem.
- 2 - BIOCH 433 General Biochemistry Lab. I
- 3 - CH 330 Introduction to Physical Chemistry³
- 3 - CP SC 120 Issues in Computers
- 3 - Science Requirement⁴
- 3 - Elective

17

Second Semester

- 3 - BIOCH 432 Biochemistry of Metabolism
- 2 - BIOCH 434 General Biochemistry Lab. II
- 3 - Approved Requirement⁵
- 3 - Literature Requirement²
- 4 - Science Requirement⁴
- 3 - Social Science Requirement

18

Senior Year

First Semester

- 3 - BIOCH 491 Special Problems in Biochemistry
- 3 - CH 313 Quantitative Analysis
- 1 - CH 317 Quantitative Analysis Lab.
- 3 - SPCH 250 Public Speaking
- 6 - Approved Requirement³

16

Second Semester

- 2 - BIOSC 493 Senior Seminar
- 3 - ENGL 314 Technical Writing
- 3 - Approved Requirement⁵
- 3 - Science Requirement⁴
- 7 - Elective

18

134 Total Semester Hours

¹CH 225 may be substituted for CH 227, and CH 226 may substitute for CH 228. In both cases, the additional hour of credit counts toward a science elective.

²ENGL 202, 203, 204, 205, 206, 207, 208, 209.

³CH 331 may be substituted.

⁴Science Requirement can be selected from biological sciences, botany, chemistry, computer science, genetics, mathematics, microbiology, physics, plant pathology, zoology, or as approved by the advisor in consultation with the biochemistry faculty.

⁵At least nine hours must be selected from the humanities and/or social sciences (Sections E.2 and F of the General Education Requirements). A one-year sequence from the following is strongly recommended: FR 101/102, GER 101/102, RUSS 101/102.

Note: No credit for AG ED 101, ENGL 100, or MTHSC 104 or 105 can be used to satisfy requirements for graduation in the Bachelor of Science in Biochemistry curriculum.

BIOLOGICAL SCIENCES

Bachelor of Arts

The Bachelor of Arts in Biological Sciences provides a strong foundation in biology and is ideal for students desiring a liberal education emphasizing an interdisciplinary approach to a thorough understanding of the life sciences.

Freshman Year

First Semester

- 5 - BIOL 110 Principles of Biology I¹
- 1 - BIOSC 101 Frontiers in Biology I²
- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 4 - Foreign Language Requirement³

17

Second Semester

- 5 - BIOL 111 Principles of Biology II¹
- 1 - BIOSC 102 Frontiers in Biology II²
- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 4 - Foreign Language Requirement³

17

Sophomore Year

First Semester

- 4 - GEN 302 Introductory Genetics
- 3 - HIST 172 Western Civilization
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Foreign Language Requirement³
- 3 - Literature Requirement⁴

17

Second Semester

- 3 - BIOSC 335 Evolutionary Biology
- 3 - CP SC 120 Issues in Computers
- 4 - MTHSC 108 Calculus of One Variable II or
- 3 - MTHSC 301 Stat. Theory and Meth. I
- 3 - Foreign Language Requirement³
- 3 - Literature Requirement⁴

15-16

Junior Year

First Semester

- 3 - BIOCH 210 Elementary Biochemistry
- 1 - BIOCH 211 Elementary Biochemistry Lab.
- 3 - ENGL 314 Technical Writing or
- 3 - SPCH 250 Public Speaking
- 4 - PHYS 207 General Physics I
- 4 - Major⁵
- 3 - Minor⁶

18

Second Semester

- 3 - ENGL 314 Technical Writing or
- 3 - SPCH 250 Public Speaking
- 3 - HIST 173 Western Civilization
- 3 - PHIL 325 Philosophy of Science or
- 3 - PHIL 326 Science and Values
- 4 - PHYS 208 General Physics II
- 4 - Major⁵

17

Senior Year**First Semester**

- 2 - BIOSC 493 Senior Seminar
 - 3 - Major³
 - 6 - Minor⁶
 - 5-6 - Elective
- 16-17

Second Semester

- 6 - Major⁶
 - 3 - Minor⁶
 - 4 - Elective
- 16

134 Total Semester Hours

¹BIOL 110 and 111 are strongly recommended; however, BIOL 103 may substitute for BIOL 110, and BIOL 104 may substitute for BIOL 111. The remaining 1-2 hours required must be satisfied by completing 1-2 extra hours in Major courses.

²If not completed during the Freshman year, required 1-2 credits must be satisfied by completing 1-2 extra credits in major elective courses.

³Four semesters of the same language are required.

⁴To be selected from sophomore literature courses (200-level only) or foreign language literature (300-level or higher).

⁵At least one lecture course must be taken from each of five designated course areas: (1) Ecology, (2) Cell Biology, (3) Physiology, (4) Animal Diversity, and (5) Plant Diversity. Laboratories must be taken with the Animal and Plant Diversity courses selected.

⁶Minors, in addition to those listed under Bachelor of Arts curricula in the college, may be arranged in consultation with a departmental advisor.

Note: No credit for AG ED 101, ENGL 100, or MTHSC 104 or 105 can be used to satisfy requirements for graduation in the Bachelor of Arts in Biological Sciences curriculum.

BIOLOGICAL SCIENCES**Bachelor of Science**

Biology encompasses the broad spectrum of the modern life sciences, including the study of all aspects of life from the structure and function of the whole organism down to the subcellular levels and up through the interactions of organisms to the integrated existence of life on the entire planet. Descriptive, structural, functional, and evolutionary questions are explored through the hierarchy of the organization of life. Applications of current advances to the health and well-being of man and his society, to nature and the continuation of earth as a balanced ecosystem, and to an appreciation of the place of natural science in our cultural heritage receive emphasis.

Majors in Biological Sciences receive classroom, laboratory and field training in biology with an emphasis on chemistry, mathematics and physics as necessary tools. The Bachelor of Science in Biological Sciences curriculum prepares students for graduate study in any of the life science areas (such as agricultural sciences, biochemistry, botany, cell and molecular biology, conservation, ecology and environmental science, entomology, forestry, genetics, industrial and regulatory biology, microbiology, morphology, physiology, wildlife biology, and zoology, among others), for the health professions (medicine, dentistry, etc.), veterinary medicine, and for science teaching.

Freshman Year**First Semester**

- 5 - BIOL 110 Principles of Biology I¹
 - 1 - BIOSC 101 Frontiers in Biology I²
 - 4 - CH 101 General Chemistry
 - 3 - ENGL 101 Composition I
 - 4 - MTHSC 106 Calculus of One Variable I
- 17

Second Semester

- 5 - BIOL 111 Principles of Biology II¹
 - 1 - BIOSC 102 Frontiers in Biology II²
 - 4 - CH 102 General Chemistry
 - 3 - ENGL 102 Composition II
 - 4 - MTHSC 108 Calculus of One Variable II
- 17

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry
 - 1 - CH 227 Organic Chemistry Lab.
 - 3 - CP SC 120 Issues in Computers
 - 4 - GEN 302 Genetics
 - 3 - Literature Requirement³
 - 3 - Elective
- 17

Second Semester

- 3 - BIOCH 301 General Biochemistry
 - 1 - BIOCH 302 Molecular Biology Lab.
 - 3 - BIOSC 335 Evolutionary Biology
 - 3 - CH 224 Organic Chemistry⁴
 - 3 - PHIL 325 Philosophy of Science or
 - 3 - PHIL 326 Science and Values
 - 3 - Social Science Requirement⁵
- 16

Junior Year**First Semester**

- 3 - ENGL 314 Technical Writing or
 - 3 - SPCH 250 Public Speaking
 - 4 - PHYS 208 General Physics I or
 - 3 - PHYS 122 Physics with Calculus I and
 - 1 - PHYS 124 Physics Lab. I⁶
 - 7 - Major⁷
 - 3 - Social Science Requirement⁵
- 17

Second Semester

- 3 - ENGL 314 Technical Writing or
 - 3 - SPCH 250 Public Speaking
 - 4 - PHYS 221 Physics with Calculus II and
 - 1 - PHYS 223 Physics Lab. II
 - 7 - Major⁷
 - 3 - Elective
- 17

Senior Year**First Semester**

- 2 - BIOSC 493 Senior Seminar
 - 12 - Major⁷
 - 3 - Elective
- 17

Second Semester

- 11 - Major⁷
 - 6 - Elective
- 17

135 Total Semester Hours

¹BIOL 110 and 111 are strongly recommended; however, BIOL 103 may substitute for BIOL 110, and BIOL 104 may substitute for BIOL 111. The remaining 1-2 hours required must be satisfied by completing 1-2 extra hours in major elective courses.

²If not completed during the Freshman year, required 1-2 credits must be satisfied by completing 1-2 extra hours in major elective courses.

³Select from sophomore literature courses (200-level only) or foreign language literature (300-level or higher).

⁴CH 228 may be substituted for BIOCH 302.

⁵Select from offerings in social sciences. (See General Education Requirements.)

⁶Physics with calculus is a three-semester sequence. Students selecting this option may wish to take PHYS 222/224 in the senior year to complete the sequence.

⁷At least one lecture course must be taken from each of five designated course areas: (1) Ecology, (2) Cell Biology, (3) Physiology, (4) Animal Diversity and (5) Plant Diversity. Laboratories must be taken with the Animal or Plant Diversity courses selected. In addition, six credits must be selected from other laboratory courses, two credits of which must come from each of two of the following designated areas: (1) Ecology, (2) Cell Biology, and (3) Physiology. The remaining courses may be selected from among the departmental course offerings at the 300 level or above.

Note: No credit for AG ED 101, ENGL 100, or MTHSC 104 or 105 can be used to satisfy requirements for graduation in the Bachelor of Science in Biological Sciences curriculum.

ENTOMOLOGY**Bachelor of Science**

Entomology is the study of insects. Emphasis areas in the entomology major prepare students for exciting careers in areas such as arthropod biodiversity research, biotechnology and genetics, ecological risk assessment, landscape plants and turfgrass entomology, medical and veterinary entomology, natural resource conservation, pest management, and urban entomology. Entomology is a pre-veterinary curriculum, and also provides an excellent foundation for graduate studies.

Emphasis areas include the following:

- Insect Science
- Urban Entomology
- Insect Biotechnology
- Insect Pest Management
- Environmental Entomology
- Landscape Plants and Turf Grass Entomology

Faculty with teaching, research or Extension experience in the emphasis areas serve as mentors to students in those areas. The curriculum provides 24 credits that a student, in conjunction with the mentor, can select to tailor the undergraduate program to meet specific interests.

Entomologists are employed in areas as diverse as agriculture, biotechnology, environmental resources, forensics, genetics, health, industry, manufacturing, teaching, and urban and landscape surroundings. There are over one million known species of insects inhabiting every habitat on earth. This diversity results in entomologists working from the Arctic and Antarctic to the tropics, from streams to deserts, and from oceans to mountain tops. Entomologists contribute directly to the health and well-being of both people and the environment.

Freshman Year**First Semester**

- 5 - BIOL 110 Principles of Biology I
- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 1 - ENT 201 Current Topics in Entomology
- 3 - MTHSC 102 Intro. to Math. Analysis or
- 4 - MTHSC 106 Calculus of One Variable I¹

16-17

Second Semester

- 5 - BIOL 111 Principles of Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 1 - ENT 201 Current Topics in Entomology
- 4 - MTHSC 108 Calculus of One Variable II or
- 3 - MTHSC 207 Multivariable Calculus

17-16

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 4 - ENT 301 General Entomology
- 3 - Computer Skills Requirement²
- 4 - Foreign Language Requirement³
- 4 - Elective

19

Second Semester

- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 4 - GEN 302 Introductory Genetics
- 4 - PHYS 200 Introductory Physics⁴
- 3 - Entomology Requirement⁵
- 4 - Foreign Language Requirement³

19

Junior Year**First Semester**

- 4 - ENT 405 Insect Morphology
- 3 - EX ST 301 Introductory Statistics or
- 3 - ACCT 201 Accounting Concepts
- 3 - SPCH 250 Public Speaking
- 3 - Emphasis Area⁶
- 3 - Social Science Requirement⁷

16

Second Semester

- 3 - BIOSC 475 Comparative Physiology
- 3 - ENT 410 Insect Taxonomy
- 4 - MICRO 305 General Microbiology
- 6 - Emphasis Area⁶

16

Senior Year**First Semester**

- 3 - BIOSC 441 Ecology
- 2 - BIOSC 445 Ecology Lab.
- 1 - ENT 461 Directed Research in Entomology
- 3 - Emphasis Area⁶
- 3 - Entomology Requirement⁵
- 3 - Humanities Requirement⁴
- 3 - Elective

18

Second Semester

- 1 - ENT 462 Seminar
- 6 - Emphasis Area⁶
- 3 - Humanities Requirement⁴
- 3 - Social Science Requirement⁷
- 4 - Elective

17

138 Total Semester Hours

¹Students who fail to make a satisfactory score on the College Board Achievement Test in Mathematics, Level II, must schedule either MTHSC 104 or 105 in consultation with their advisors.

²Select from computer skills courses listed under General Education Requirements.

³Two semesters of the same foreign language are required.

⁴Pre-veterinary students and students interested in the Insect Biotechnology Emphasis Area must substitute PHYS 207 and take PHYS 208 as an Emphasis Area course.

⁵Students must select from 300-level or higher ENT courses in conjunction with the Emphasis Area advisor.

⁶Students are encouraged to select an emphasis area by the second semester of their sophomore year in consultation with the departmental advisor. Emphasis areas are *Insect Science*, *Environmental Entomology*, *Urban Entomology*, *Landscape Plants and Turf Grass Entomology*, *Insect Biotechnology*, and *Insect Pest Management*. Students not selecting a specific emphasis area will be advised in *Insect Science*. Specific courses in support of each emphasis area must be selected from departmental approved lists in conjunction with the emphasis area advisor.

⁷Select from social science courses listed under General Education Requirements.

⁸Select from humanities courses listed under General Education Requirements.

Note: In selecting courses to fulfill humanities and social science general education requirements, care must be taken to assure that the writing intensive requirement is also met.

FOOD SCIENCE**Bachelor of Science**

Food Science majors apply principles of basic and applied sciences to the production, processing, evaluation, packaging, distribution and utilization of safe, nutritious, and enjoyable foods and food products. The safety of foods during processing and preservation, the provision of foods with adequate nutritional value, the facilitation of adherence to dietary recommendations, and the conservation of resources are important consumer issues addressed by food scientists.

The curriculum allows flexibility for concentrating in Food Science and Technology or in Human Nutrition and Dietetics. In Food Science and Technology, students may emphasize business, engineering, food packaging, or other areas that complement requirements of the Institute of Food Technologists. Students choosing Nutrition and Dietetics emphasize courses in nutrition and related areas.

Food processing industries, ingredient manufacturers, and packaging supplier companies employ graduates in food product development, quality assurance, production, management, and business and technical sales. State and federal agencies also need graduates for food safety and regulatory positions. With Nutrition and Dietetics emphasis, employment opportunities include nutritionists, consultants, and food specialists. Students are also well prepared to pursue graduate study in many areas.

Freshman Year**First Semester**

- 4 - BIOL 103 General Biology I or
- 5 - BIOL 110 Principles of Biology I
- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 1 - FD SC 101 Epochs in Man's Struggle for Food
- 4 - Mathematical Sciences Requirement¹

16-17

Second Semester

- 4 - BIOL 104 General Biology II or
- 5 - BIOL 111 Principles of Biology II
- 4 - CH 102 or 112 General Chemistry
- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 2 - FD SC 102 Perspectives in Food and Nutr. Sci.

16-17

Sophomore Year**First Semester**

- 3 - BIOCH 210 Elementary Biochemistry
- 1 - BIOCH 211 Elementary Biochemistry Lab.
- 4 - CH 201 Survey of Organic Chemistry or
- 3 - CH 223 Organic Chemistry and
- 1 - CH 227 Organic Chemistry Lab.
- 4 - PHYS 200 Introductory Physics or
- 3 - PHYS 122 Physics with Calculus I or
- 4 - PHYS 207 General Physics I
- 3 - Social Science Requirement²
- 2 - Elective

16-17

Second Semester

- 4 - FD SC 214 Food Resources and Preservation
- 3 - Literature Requirement³
- 3 - Oral Communication Requirement³
- 3 - Social Science Requirement²
- 3 - Elective

16

FOOD SCIENCE AND TECHNOLOGY STUDY AREA**Junior Year****First Semester**

- 3 - FD SC 404 Food Preservation and Processing
- 1 - FD SC 406 Food Preservation and Proc. Lab. I
- 4 - MICRO 305 General Microbiology
- 3 - NUTR 451 Human Nutrition
- 3 - Emphasis Area⁴
- 3 - Elective

17

Second Semester

- 3 - EX ST 301 Introductory Statistics
- 4 - FD SC 408 Food Process Engineering
- 4 - MICRO 407 Food and Dairy Microbiology
- 3 - Writing Intensive Requirement²
- 2 - Elective

16

Senior Year**First Semester**

- 4 - FD SC 401 Food Chemistry I
 - 3 - FD SC 409 TQM for the Food and Pkg. Ind.
 - 1 - FD SC 417 Seminar
 - 5 - Emphasis Area⁴
 - 2 - Elective
- 15

Second Semester

- 4 - FD SC 402 Food Chemistry II
 - 1 - FD SC 418 Seminar
 - 4 - Department Requirement⁵
 - 3 - Humanities Requirement²
 - 4 - Emphasis Area⁴
- 16

128-131 Total Semester Hours

NUTRITION AND DIETETIC STUDY AREA

Junior Year**First Semester**

- 2 - BIOSC 222 Human Anatomy and Phys. I
 - 2 - BIOSC 224 Human Anatomy and Phys. I Lab.
 - 3 - FD SC 306 Food Service Operations
 - 3 - FD SC 404 Food Preservation and Processing
 - 2 - FD SC 407 Quality Food Production
 - 3 - NUTR 451 Human Nutrition
 - 3 - Humanities Requirement²
- 18

Second Semester

- 2 - BIOSC 223 Human Anatomy and Phys. II
 - 2 - BIOSC 225 Human Anat. and Phys. II Lab.
 - 3 - EX ST 301 Introductory Statistics
 - 3 - NUTR 455 Nutrition and Metabolism
 - 3 - Writing Intensive Requirement²
 - 3 - Elective
- 16

Senior Year**First Semester**

- 4 - FD SC 401 Food Chemistry I
 - 3 - FD SC 409 TQM for the Food and Pkg. Ind.
 - 4 - MICRO 305 General Microbiology
 - 4 - NUTR 425 Nutrition and Dietetics
 - 3 - Registration Eligibility Requirement⁶
- 18

Second Semester

- 4 - FD SC 402 Food Chemistry II
 - 4 - MICRO 407 Food and Dairy Microbiology
 - 3 - NUTR 426 Community Nutrition
 - 3 - Registration Eligibility Requirement⁶
 - 2 - Elective
- 16

132-135 Total Semester Hours

¹MTHSC 106 or equivalent.²See General Education Requirements.³SPCH 250 or equivalent⁴See departmental advisor for emphasis areas and course requirements.⁵FD SC 421, 464, 466, or 491.⁶See departmental advisor for registration eligibility requirements of courses to meet additional competencies of the American Dietetic Association; students not pursuing registration eligibility will have slightly different course options.**FOREST PRODUCTS****Bachelor of Science**

The Forest Products curriculum combines a broad education in the sciences and humanities. Emphasis in the professional courses is placed on the properties and use of wood. Graduates are employed by wood-using industries and their suppliers, research laboratories, trade associations, and state and federal organizations.

The core curriculum allows for three areas of specialization: Wood Science, Wood Industries Management, and Forest Management. Wood Science deals with the properties and processing of wood, wood fiber, and products derived from wood. Wood Industries Management prepares students for the managerial aspects of forest products industries, including marketing and technical services. Emphasis areas can be explored in more depth through use of the remaining elective credits.

Completion of the curriculum leads to a Bachelor of Science degree in Forest Products. Graduate studies leading to the Master of Science, Master of Forest Resources, and Doctor of Philosophy degrees are also offered. At this time no new students are being enrolled in the Forest Products major; however, students interested in this field are encouraged to enroll in the Forest Products minor.

Freshman Year**First Semester**

- 4 - BIOL 103 General Biology I
 - 4 - CH 105 Beg. General and Organic Chemistry¹
 - 3 - ENGL 101 Composition I
 - 1 - FOR 101 Introduction to Forestry
 - 3 - MTHSC 102 Intro. to Mathematical Analysis²
 - 3 - Elective
- 18

Second Semester

- 3 - BIOSC 205 Plant Form and Function
 - 1 - BIOSC 206 Plant Form and Function Lab.
 - 4 - CH 106 Beg. General and Organic Chemistry¹
 - 3 - ENGL 102 Composition II
 - 1 - FOR 102 Introduction to Forestry
 - 3 - MTHSC 207 Multivariable Calculus²
 - 3 - Elective
- 18

Sophomore Year**First Semester**

- 3 - CP SC 120 Issues in Computers
 - 3 - FOR 205 Dendrology
 - 3 - FOR 221 Wood Properties I
 - 4 - PHYS 207 General Physics I
 - 3 - Literature Requirement³
- 16

Second Semester

- 3 - ECON 200 Economic Concepts
 - 3 - FOR 222 Wood Properties II
 - 2 - FOR 306 Wood and Wood Fiber Identification
 - 4 - PHYS 208 General Physics II
 - 3 - Social Science Requirement⁴
 - 3 - Elective
- 18

Forestry Summer Camp

- 1 - FOR 254 Forest Products
 - 1 - FOR 255 Secondary Wood Products
 - 2 - FOR 257 Forest Products Measurements
- 4

Junior Year**First Semester**

- 3 - ENGL 314 Technical Writing
 - 3 - FOR 321 Drying and Machining of Wood
 - 3 - FOR 425 Forest Resource Management Plans
 - 3 - Statistics Requirement⁵
 - 6 - Study Area⁶
- 18

Second Semester

- 3 - FOR 311 Forest Products Marketing Practices
 - 2 - FOR 322 Wood Adhesives and Finishes
 - 2 - FOR 323 Deterioration and Preservation of Wood
 - 3 - SPCH 250 Public Speaking
 - 6 - Study Area⁶
- 16

Senior Year**First Semester**

- 3 - FOR 422 Forest Products International Trade
 - 3 - FOR 429 Wood Design
 - 3 - FOR 430 Composite Wood Materials
 - 6 - Study Area⁶
 - 3 - Elective
- 18

Second Semester

- 3 - FOR 419 Senior Problems
 - 3 - FOR 420 Forest Products
 - 3 - Humanities Requirement⁴
 - 6 - Study Area⁶
 - 3 - Elective
- 18

144 Total Semester Hours

¹CH 101/102 may be substituted.²A student with a SAT Mathematics Achievement Test, Level II score of 550 or greater may take MTHSC 106 to satisfy the Mathematics Requirement; otherwise, MTHSC 102 and 207 are required. Two additional hours may be used as electives.³ENGL 202, 203, 204, 205, 206, 207, 208, 209.⁴See General Education Requirements.⁵EX ST 301, MTHSC 203, 301.⁶Study areas are Wood Science and Technology, Forest Products Manufacturing Management, and Forest Products Marketing. Select one of these in consultation with advisor.

FOREST RESOURCE MANAGEMENT

Bachelor of Science

The Forest Resource Management curriculum combines a broad education in the arts and sciences with applied forest sciences. This combination provides the necessary foundation for the scientific management of forest resources, products, and services.

Foresters are qualified for a broad spectrum of employment opportunities in the public and private sectors. They may be engaged as managers, administrators, or owners of forest lands or forest-based

businesses; as technical specialists in the production of timber, useable water, wildlife, and aesthetic values, and in the recreational use of the forest; or as professionals in other areas where the conservation of natural resources is a matter of concern. Foresters earning advanced degrees find employment in academic work and in research conducted by public and private agencies.

The undergraduate curriculum provides a strong program in the basic knowledge and skills required of a professional forester. Forest Resources Management majors will select a minor study area. (See minors listed in the Programs and Degrees section). The curriculum is also designed to provide the necessary prerequisites for those students who desire to continue in graduate study. The Department of Forestry offers graduate programs that lead to the Master of Science, Master of Forest Resources, and Doctor of Philosophy degrees. The Forest Resource Management curriculum is accredited by the Society of American Foresters.

Freshman Year

First Semester

- 4 - BIOL 103 General Biology I
- 4 - CH 105 Beg. General and Organic Chemistry¹
- 3 - ENGL 101 Composition I
- 1 - FOR 101 Introduction to Forestry
- 3 - MTHSC 102 Intro. to Mathematical Analysis

15

Second Semester

- 4 - BIOL 104 General Biology II²
- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 3 - FOR 221 Wood Properties I
- 3 - Elective

16

Sophomore Year

First Semester

- 4 - AGRON 202 Soils
- 3 - FOR 205 Dendrology
- 3 - Literature Requirement³
- 3 - Social Science Requirement⁴
- 3 - Elective

16

Second Semester

- 3 - FOR 206 Forest Ecology
- 4 - PHYS 200 Introductory Physics
- 3 - SPCH 250 Public Speaking
- 3 - Economic Requirement⁵
- 3 - Humanities Requirement⁶

16

Forestry Summer Camp

- 2 - FOR 251 Forest Communities
- 3 - FOR 252 Forest Engineering
- 3 - FOR 253 Forest Resource Measurements I
- 1 - FOR 254 Forest Products
- 1 - FOR 258 Introduction to Forest Pests

10

Junior Year

First Semester

- 3 - FOR 304 Forest Resource Economics
- 3 - FOR 413 Integrated Forest Pest Management
- 3 - FOR 460 Silviculture I
- 3 - EX ST 301 Introductory Statistics⁴
- 4 - Elective

16

Second Semester

- 3 - ENGL 314 Technical Writing
- 3 - FOR 302 Forest Resource Measurements II
- 2 - FOR 308 Aerial Photographs in Forestry
- 3 - FOR 462 Silviculture II
- 6 - Minor⁷

17

Senior Year

First Semester

- 4 - FOR 314 Harvesting Forestry Products
- 2 - FOR 416 Forest Policy and Administration
- 3 - FOR 417 Forest Res. Mgt. and Regulation
- 2 - FOR 418 Forest Resource Valuation
- 6 - Minor⁷

17

Second Semester

- 2 - FOR 406 Forest Watershed Management
- 3 - FOR 415 Forest Wildlife Management
- 2 - FOR 423 Current Issues in Natural Resources
- 3 - FOR 425 Forest Resource Management Plans
- 2 - FOR 431 Recreation Resource Planning
- 3 - Minor⁷

15

138 Total Semester Hours

¹CH 101 may be substituted.

²Can be satisfied by CH 102 (if CH 101 is taken) or 106 (if CH 105 is taken).

³ENGL 202, 203, 204, 205, 206, 207, 208, 209.

⁴See General Education Requirements.

⁵To be selected in consultation with advisor.

⁶MTHSC 203, 301, or equivalent may be taken in lieu of EX ST 301.

⁷To be selected by the end of the sophomore year.

HORTICULTURE

Bachelor of Science

Horticulture is the art, science, and business that deals with fruit and vegetable crops, ornamental plants, and turfgrasses and their production, utilization, and maintenance. A strong foundation in the basic sciences and humanities is necessary in all facets of horticulture. Undergraduate majors fulfill this need by taking courses in mathematics, chemistry, botany, physics, computer science, communications, economics, and humanities. Horticulture as a science depends equally on such allied disciplines as plant pathology, plant physiology, entomology, forestry, agronomy and soils, agricultural engineering, and agricultural economics. Business electives contribute to a well-rounded curriculum. An ever expanding segment of horticulture involves the management of enterprises, from production to distribution and marketing. Horticulture as an art involves the arrangement of plants in an aesthetically pleasing fashion, an exterior landscape for a residence or building or manicuring a golf green. All aspects

of horticultural plants are the realm of the Horticulture major—growing, maintaining, selling, arranging, selecting.

The major in Horticulture broadly represents all crops and commodities. The Turfgrass option is sufficiently different so that it is listed separately. Even though broad training is required of all Horticulture majors, the opportunity exists to tailor one's courses around the traditional commodities (fruits, vegetables, nursery crops, landscape design, and floriculture) by the appropriate selection of electives.

Enhancements allow the student to begin professional development while still enrolled as an undergraduate. The opportunity to complete an internship in a horticultural enterprise is one enhancement that is strongly recommended. Students considering graduate school are advised to enhance their programs by taking optional courses in the basic sciences as well as by conducting an undergraduate research project. Persons with strong interests in a specific discipline may complete special problems under the direct supervision of a faculty member. The state-of-the-art computer laboratory in the Department of Horticulture and the integration of computer applications into most horticulture courses ensure that students develop computer skills.

Freshman Year

First Semester

- 4 - BIOL 103 General Biology I
- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 3 - HORT 101 Horticulture
- 3 - MTHSC 102 Intro. to Mathematical Analysis

17

Second Semester

- 3 - BIOSC 205 Plant Form and Function
- 1 - BIOSC 206 Plant Form and Function Lab.
- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 3 - EX ST 301 Introductory Statistics *or*
- 3 - MTHSC 101 Introduction to Probability
- 3 - Social Science Requirement¹

17

Sophomore Year

First Semester

- 3 - BIOSC 406 Introductory Plant Taxonomy
- 1 - BIOSC 407 Plant Taxonomy Lab.
- 3 - CH 223 Organic Chemistry *and*
- 1 - CH 227 Organic Chemistry Lab. *or*
- 3 - BIOCH 210 Elementary Biochemistry *and*
- 1 - BIOCH 211 Elem. Biochemistry Lab. *or*
- 4 - CH 201 Survey of Organic Chemistry
- 4 - ENT 301 General Entomology
- 3 - HORT 303 Plant Materials
- 3 - Literature Requirement²

18

Second Semester

- 4 - AGRON 202 Soils
- 3 - HORT 208 Landscape Appreciation
- 4 - PHYS 200 Introductory Physics
- 3 - SPCH 250 Public Speaking
- 3 - Computer Skills Requirement²

17

Junior Year**First Semester**

- 3 - HORT 305 Plant Propagation
- 4 - HORT 456 Vegetable Crops
- 3 - Horticulture Requirement¹
- 3 - Humanities Requirement²
- 4 - Science Requirement⁴

17

Second Semester

- 3 - AG M 301 Soil and Water Conservation
- 3 - BIOSC 401 Plant Physiology
- 1 - BIOSC 402 Plant Physiology Lab.
- 3 - HORT 310 Greenhouse Crop Physiology
- 3 - Business Requirement
- 3 - Writing Intensive Requirement²
- 1 - Elective

17

Senior Year**First Semester**

- 3 - HORT 352 Tree Fruit Culture and Phys. or
3 - HORT 455 Small Fruit Crops
- 3 - HORT 412 Turfgrass Management
- 3 - Horticulture Requirement³
- 3 - Business Requirement²
- 6 - Elective

18

Second Semester

- 1 - HORT 409 Seminar
- 3 - PL PA 401 Plant Pathology
- 3 - Horticulture Requirement³
- 3 - Science Requirement⁴
- 3 - Social Science Requirement²
- 3 - Elective

16

137 Total Semester Hours

¹AP EC 202 or ECON 211.²See advisor for General Education Requirements.³FOR 309, HORT 202, 304, 308, 352 or 455, 400, 406, 415, 416, 461, 464, 470, HORT (AGRON) 433.⁴Select, with advisor's assistance, from the approved departmental list of upper-division courses as follows:

Group I—biological sciences, genetics, microbiology. (Select at least three credits.)

Group II—agriculture, agronomy, integrated pest management, plant pathology

⁵Select from the departmental list of approved courses from accounting; agricultural and applied economics; law; management; marketing; and parks, recreation and tourism management. (See advisor.)**TURFGRASS OPTION**

The Turfgrass option is tailored for students interested in careers in the rapidly growing turfgrass industry. This option specifies courses in turfgrass management, pathology of turf and ornamental plants, agricultural mechanization, personnel management, soil fertility, soil microbiology, weed control, and park and recreation management. Graduates pursue careers in professional lawn-care establishment and maintenance of parks, athletic fields, and golf courses; production and sale of seed, sod, supplies, and equipment; or service as technicians for private businesses or government agencies.

Freshman Year**First Semester**

- 4 - BIOL 103 General Biology I
- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 3 - HORT 101 Horticulture
- 3 - MTHSC 102 Intro. to Mathematical Analysis

17

Second Semester

- 3 - BIOSC 205 Plant Form and Function
- 1 - BIOSC 206 Plant Form and Function Lab.
- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 3 - EX ST 301 Introductory Statistics or
3 - MTHSC 101 Introduction to Probability
- 3 - Social Science Requirement¹

17

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry and
4 - CH 201 Survey of Organic Chemistry or
1 - CH 227 Organic Chemistry Lab. or
4 - CH 201 Survey of Organic Chemistry or
3 - BIOCH 210 Elementary Biochemistry and
1 - BIOCH 211 Elementary Biochemistry Lab.
- 3 - HORT 303 Plant Materials
- 3 - HORT 305 Plant Propagation
- 3 - Business Requirement²
- 3 - Social Science Requirement³
- 1 - Elective

17

Second Semester

- 3 - AG M 205 Principles of Farm Shop
- 4 - AGRON 202 Soils
- 3 - HORT 208 Landscape Appreciation
- 3 - Literature Requirement¹
- 3 - Writing Intensive Requirement¹

16

Junior Year**First Semester**

- 4 - ENT 301 General Entomology
- 3 - HORT 412 Turfgrass Management
- 3 - MGT 307 Personnel Management
- 3 - SPCH 250 Public Speaking
- 3 - Science Requirement⁴

16

Second Semester

- 3 - BIOSC 401 Plant Physiology
- 1 - BIOSC 402 Plant Physiology Lab.
- 4 - PHYS 200 Introductory Physics
- 3 - PL PA 401 Plant Physiology
- 3 - Computer Skills Requirement¹
- 3 - Horticulture Requirement³

17

Senior Year**First Semester**

- 3 - PL PA (ENT) 406 Diseases and Insects of Turfgrasses
- 3 - Horticulture Requirement²
- 3 - Humanities Requirement¹
- 4 - Science Requirement⁴
- 4 - Elective

17

Second Semester

- 3 - AG M 301 Soil and Water Conservation
- 1 - HORT 409 Seminar
- 3 - Horticulture Requirement⁵
- 3 - Science Requirement⁴
- 7 - Elective

17

134 Total Semester Hours

¹See advisor.²Select from the departmental list of approved upper-division courses from accounting; agricultural and applied economics; law; management; marketing; and parks, recreation and tourism management.³AP EC 202 or ECON 211.⁴Select, with advisor's assistance, from the departmental list of approved upper-division courses as follows:

Group I—biological sciences, genetics, microbiology. (Select at least three credits.)

Group II—agriculture, agronomy, integrated pest management, plant pathology.

⁵FOR 309, HORT 202, 304, 308, 310, 352, 400, 406, 415, 416, 455, 456, 461, 464, 470, HORT (AGRON) 433.**MEDICAL TECHNOLOGY****Bachelor of Science**

Medical technology is the area of health care in which analyses are performed on human body fluids to detect disease conditions. The medical technologist must know how to perform and evaluate tests made in several broad disciplines, including clinical chemistry, clinical microbiology, immunohematology, hematology, and blood bank. To perform in such diversified areas medical technologists must have a broad education in the basic sciences and rigorous training in clinical laboratory science. They must know the principles of test procedures and equipment, as well as the significance of the results of these tests in the diagnosis and treatment of disease. Medical technologists find employment in hospital clinical laboratories and in private, state, and federal health laboratories.

The program in Medical Technology consists of three years of lectures and laboratories on the Clemson campus and one year of clinical experience at an accredited school of medical technology. The courses required in the first three years of the program must be completed before the student can begin the clinical (fourth) year. The student must be in good standing at the University and have a grade-point ratio of 2.0 or above before entering a school of medical technology. Admission to these schools is by competition. Each school selects its students based on published admission criteria which include grade-point ratio, grades in science courses, letters of reference, and interviews. Clemson University is affiliated with McLeod Regional Medical Center. Applications to this school and others, such as the Medical University of South Carolina, should be made during the first semester of the junior year.

Upon satisfactory completion of the requirements of the curriculum, the student will receive the Bachelor of Science degree in Medical Technology from Clemson University. In addition to the degree, satisfactory performance on a certification exam is required by most employers.

Freshman Year**First Semester**

- 5 - BIOL 110 Principles of Biology I
- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 1 - M T 101 Introduction to Medical Technology
- 4 - MTHSC 106 Calculus of One Variable I

17

Second Semester

- 5 - BIOL 111 Principles of Biology II
- 4 - CH 112 General Chemistry
- 3 - ENGL 102 Composition II
- 3 - EX ST 301 Introductory Statistics or
- 3 - MTHSC 301 Stat. Theory and Meth. I
- 3 - Elective

18

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 3 - HIST 172 or 173 Western Civilization
- 4 - MICRO 305 General Microbiology
- 4 - PHYS 207 General Physics I
- 3 - Literature Requirement¹

18

Second Semester

- 3 - BIOCH 301 General Biochemistry
- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 4 - PHYS 208 General Physics II
- 3 - Humanities Requirement²
- 3 - Elective

17

Junior Year**First Semester**

- 3 - CH 313 Quantitative Analysis
- 1 - CH 317 Quantitative Analysis Lab.
- 3 - MICRO 414 Basic Immunology
- 3 - English Requirement³
- 4 - Elective

14

Second Semester

- 4 - GEN 302 Introductory Genetics
- 4 - MICRO 411 Pathogenic Bacteriology
- 3 - Humanities Requirement²
- 3 - Option Requirement⁴
- 3 - Social Science Requirement²

17

Senior Year

(52 Weeks)

- 3 - M T 401 Immunology
- 8 - M T 402 Clinical Microbiology
- 5 - M T 403 Hematology and Hemostasis
- 4 - M T 404 Blood Bank
- 2 - M T 407 Urinalysis
- 10 - M T 408 Clinical Chemistry
- 2 - M T 491 Special Topics in Medical Tech.

34

135 Total Semester Hours

¹ENGL 202, 203, 204, 205, 206, 207, 208, 209.²Select from courses required to complete an alternate degree in Microbiology should the student not be accepted to a hospital school after completion of the academic requirement for the baccalaureate degree in Medical Technology.³Select from advanced writing or public speaking.⁴The option requirement is to be selected from the following: BIOSC 456, MICRO 400, 401, 412, 413, 415, 416, and other courses that will serve as background courses for medical technology.**Notes:**

1. The manner in which each accredited clinical program implements the above curriculum may vary because of institutional differences.

2. AG ED 101, ENGL 100, MTHSC 104 or 105 cannot be used to satisfy requirements for graduation.

MICROBIOLOGY**Bachelor of Science**

Microbiology deals with the study of bacteria, viruses, yeasts, filamentous fungi, protozoa, and unicellular algae. The microbiologist seeks to describe these organisms in terms of their structures, functions and processes of reproduction, growth and death, at both the cellular and molecular levels. He/she is also concerned with their ecology, particularly in regard to their pathological effects on man, and with their economic importance.

The Microbiology major provides a thorough training in the basic microbiological skills. Furthermore, the student receives instruction in mathematics, physics, chemistry, and biochemistry, all of which are essential to the training of a modern microbiologist. The student can prepare for a variety of careers through a wide choice of electives. The Microbiology curriculum with Molecular Biology option is recommended for students planning post-graduate programs. The microbiology graduate may enter graduate school in microbiology, biochemistry, bioengineering or related disciplines; he/she may enter a medical or dental school or pursue a career in one of the many industries or public service departments dependent upon microbiology. Some of these are the fermentation and drug industries, medical and public health microbiology, various food industries, and agriculture.

Microbiology majors planning to apply for admission to a medical or dental school should inform their advisors immediately upon entering the Microbiology program.

Freshman Year**First Semester**

- 5 - BIOL 110 Principles of Biology I¹
- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I

16

Second Semester

- 5 - BIOL 111 Principles of Biology II¹
- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 1 - MICRO 100 Microbes and Human Affairs
- 3-4 - Mathematical Science Requirement²

16-17

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 3 - CP SC 120 Issues in Computers
- 4 - MICRO 305 General Microbiology
- 3 - Literature Requirement³
- 3 - Social Science Requirement

17

Second Semester

- 3 - BIOCH 301 General Biochemistry
- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 3 - Literature Requirement³
- 4-3 - Mathematical Science or Science Requirement⁴
- 3 - Microbiology Requirement⁵

17-16

Junior Year**First Semester**

- 4 - MICRO 401 Advanced Bacteriology
- 3 - SPCH 250 Public Speaking
- 4-3 - Physics Requirement⁶
- 6-7 - Elective

17

Second Semester

- 4 - MICRO 412 Bacterial Physiology
- 4 - MICRO 415 Microbial Genetics
- 4 - Physics Requirement⁶
- 3 - Social Science Requirement
- 3-4 - Elective

18-19

Senior Year**First Semester**

- 3 - ENGL 314 Technical Writing
- 14-13 - Approved Requirement⁷

17-16

Second Semester

- 4 - MICRO 411 Pathogenic Bacteriology
- 12 - Approved Requirement⁷

16

134 Total Semester Hours

¹BIOL 103 may substitute for BIOL 110, and BIOL 104 may substitute for BIOL 111; the remaining 1-2 hours required must be satisfied by completing 1-2 extra hours in either biological sciences or microbiology.²MTHSC 108 is required for the Microbiology-Molecular Biology option. Microbiology majors may select MTHSC 108 or 301.³ENGL 202, 203, 204, 205, 206, 207, 208, 209.⁴Select from EX ST 301 (only if MTHSC 301 not completed), GEOL 101, MTHSC 108, or any science course at the sophomore level or above, excluding microbiology, with advisor's approval.⁵A minimum of 15 credits must be selected from the following: BIOSC 403, 404, 425, 426, 456/457, BOT 413, MICRO 400, 403, 407, 410, 413, 414, 416, 417, 491, PL PA 456, P S 458.⁶To be selected from the following course sequences: either PHYS 207, 208 or 122, 221, 223.**Note:** AG ED 101, ENGL 100, MTHSC 104 or 105 cannot be used to satisfy requirements for graduation.

MOLECULAR BIOLOGY OPTION

See Microbiology curriculum for Freshman year.

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 3 - CP SC 120 Issues in Computers
- 4 - MICRO 305 General Microbiology
- 3 - Literature Requirement¹
- 3 - Social Science Requirement

17

Second Semester

- 3 - BIOCH 301 General Biochemistry
- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 3 - Literature Requirement¹
- 3 - Microbiology Requirement²
- 3 - Social Science Requirement

16

Junior Year**First Semester**

- 4 - MICRO 401 Advanced Bacteriology
- 3 - MICRO 414 Basic Immunology
- 3 - SPCH 250 Public Speaking
- 4-3 - Physics Requirement³
- 3-4 - Elective

17

Second Semester

- 3 - CH 313 Quantitative Analysis
- 4 - MICRO 412 Bacterial Physiology
- 3 - MICRO 417 Molecular Mechanisms of Carcinogenesis and Aging
- 4 - Physics Requirement³
- 3 - Elective

17

Senior Year**First Semester**

- 3 - BIOCH 423 Principles of Biochemistry
- 3 - ENGL 314 Technical Writing
- 4 - MICRO 415 Microbial Genetics
- 3 - MICRO 416 Introductory Virology
- 3 - Elective

16

Second Semester

- 3 - BIOCH 432 Biochemistry of Metabolism
- 4 - MICRO 411 Pathogenic Bacteriology
- 3 - MICRO 491 Special Problems

- 8 - Elective

18

134 Total Semester Hours

¹ENGL 202, 203, 204, 205, 206, 207, 208, 209.²BIOC 403, 404, 425, 426, 456/457, BOT 413, MICRO 400, 403, 407, 410, 413, PL PA 456, P S 458.³Select from the following course sequences: either PHYS 207, 208 or 122, 221, 223.**PACKAGING SCIENCE****Bachelor of Science**

Packaging Science is a discipline involving the use of materials, methods, and machinery to develop and produce packages that protect and preserve products, instruct the consumer and help market the product. Environmental concerns are very important in packaging selection and design. Packaging is a large, international industry, an extremely dynamic, rapidly growing field. On the basis of gross sales, it is the third largest industry in the United States. Virtually everything grown or manufactured is packaged in some fashion. The food industry is the largest user of packages, but non-food packaging is essential also.

Opportunities for employment include a wide variety of career paths (e.g., marketing, manufacturing, research and development, design, transportation and distribution). Corporations which manufacture and sell packages as well as companies that purchase and use packages need well-educated and well-trained packaging personnel.

The student in Packaging Science will select from two emphasis areas: Food Packaging and General Packaging. The basic curricula are the same, but students selecting the Food Packaging option are required to have more food-related courses. Those selecting the General Packaging option can concentrate in other areas of specialty, such as environmental science or graphic communications.

Freshman Year**First Semester**

- 4 - BIOL 103 General Biology I
- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 1 - PKGSC 101 Packaging Orientation
- 3 - Mathematical Sciences Requirement¹

15

Second Semester

- 4 - BIOL 104 General Biology II
- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 4 - MTHSC 106 Calculus of One Variable I
- 2 - PKGSC 102 Intro. to Packaging Science
- 1 - Elective

18

Sophomore Year**First Semester**

- 4 - CH 201 Survey of Organic Chemistry or
- 3 - CH 223 Organic Chemistry and
- 1 - CH 227 Organic Chemistry Lab.
- 3 - CP SC 120 Issues in Computers
- 4 - PHYS 207 General Physics I²
- 3 - PKGSC 202 Packaging Materials and

- Manufacturing
- 3 - THRD 180 Introduction to Technical Drawing and Computer Aided Drafting³

17

Second Semester

- 4 - FD SC 214 Food Resources and Preservation
- 4 - G C 104 Graphic Communications I
- 3 - PKGSC 204 Container Systems
- 1 - PKGSC 206 Container Systems Lab.
- 3 - Emphasis Area¹
- 3 - Humanities Requirement⁴

18

Junior Year**First Semester**

- 3 - EX ST 301 Introductory Statistics
- 4 - MICRO 305 General Microbiology
- 3 - PKGSC 404 Mech. Properties of Packages and Principles of Package Evaluation
- 2 - PKGSC 454 Package Evaluation Lab.
- 3 - Social Science Requirement³
- 3 - Elective

18

Second Semester

- 3 - ENGL 304 Business Writing
- 3 - PKGSC 316 Application of Polymers in Packaging
- 3 - SPCH 250 Public Speaking
- 5 - Emphasis Area¹
- 3 - Social Science Requirement³

17

Senior Year**First Semester**

- 3 - PKGSC 368 Packaging and Society
- 3 - PKGSC 420 Package Design and Dev.
- 4 - Emphasis Area¹
- 3 - Humanities Requirement⁴
- 3 - Elective

16

Second Semester

- 3 - FD SC 464 Food Packaging Systems
- 1 - FD SC 466 Food Packaging Systems Lab.
- 3 - PKGSC 401 Packaging Machinery
- 3 - PKGSC 440 Packaging Distribution
- 3 - Emphasis Area¹
- 3 - Elective

16

135 Total Semester Hours

¹See advisor.²PHYS 122 and 124 may be substituted.³E G 208 may be substituted.⁴Select six credits in accordance with General Education Requirements.⁵AP EC 202 or ECON 211 and a section of three credits from the following: HIST 101, 102, 172, 173, PO SC 101, PSYCH 201, R S (SOC) 401; SOC 201, GEOG 101 or 103.**PLANT PATHOLOGY****Bachelor of Science**

Plant pathology, the study of plant diseases, is a challenging biological and agricultural science. As a career, it is exciting, essential, and rewarding. As a profession, it requires ambition, skill, and dedication, while offering the opportunity for intellectual and personal fulfillment. Plant pathologists continually pit their abilities and energies against more than 50,000 destructive plant diseases.

Job opportunities include private consulting, cooperative extension services, agricultural sales, federal and state government and foreign service, technical work, biotechnology, various integrated pest-management programs, farming, and graduate programs. Salaries are competitive with other biological and agricultural professions.

Advisors for Plant Pathology undergraduates attempt to tailor the program of study to fit the student's long-term goals.

Freshman Year

First Semester

- 4 - BIOL 103 General Biology I *or*
 - 5 - BIOL 110 Principles of Biology I
 - 4 - CH 101 General Chemistry
 - 3 - ENGL 101 Composition I
 - 3 - MTHSC 102 Intro. to Mathematical Analysis
- 14-15

Second Semester

- 4 - BIOL 104 General Biology II *or*
 - 5 - BIOL 111 Principles of Biology II
 - 4 - CH 102 General Chemistry
 - 3 - ENGL 102 Composition II
 - 7 - Elective
- 18-19

Sophomore Year

First Semester

- 4 - AGRON 202 Soils
 - 3 - CH 223 Organic Chemistry
 - 1 - CH 227 Organic Chemistry Lab.
 - 4 - ENT 301 General Entomology
 - 3 - Computer Skills Requirement¹
 - 3 - Humanities Requirement¹
- 18

Second Semester

- 3 - AP EC 202 Agricultural Economics
 - 3 - CH 224 Organic Chemistry
 - 4 - GEN 302 Introductory Genetics
 - 4 - PHYS 200 Introductory Physics
 - 3 - Humanities Requirement¹
- 17

Junior Year

First Semester

- 3 - BIOCH 301 General Biochemistry
 - 4 - MICRO 305 General Microbiology
 - 3 - PL PA 401 Plant Pathology
 - 3 - Departmental Requirement²
 - 3 - Social Science Requirement¹
- 16

Second Semester

- 3 - BIOSC 401 Plant Physiology
 - 1 - BIOSC 402 Plant Physiology Lab.
 - 3 - BIOSC 406 Introductory Plant Taxonomy
 - 1 - BIOSC 407 Introductory Plant Taxonomy Lab.
 - 3 - PL PA 456 Plant Virology
 - 3 - SPCH 250 Public Speaking
 - 3 - Writing Intensive Requirement¹
- 17

Senior Year

First Semester

- 3 - BIOSC 425 Introductory Mycology
 - 2 - BIOSC 426 Mycology Practicum
 - 3 - EX ST 301 Introductory Statistics
 - 3 - PL PA 458 Plant Parasitic Nematodes
 - 3 - Departmental Requirement²
 - 3 - Social Science Requirement¹
 - 2 - Elective
- 19

Second Semester

- 3 - PL PA 451 Bacterial Plant Pathogens
 - 3 - Departmental Requirement²
 - 10 - Elective
- 16

135-137 Total Semester Hours

¹See General Education Requirements.

²At least nine credits must be selected from the following: AGRON 405, 407, 421, 422, 423, 425, 490, BIOCH 301, 423, 433, 434, CH 313, 317, ENT 401, HORT 305, 352, 455, MICRO 416, PL PA 411.

PREPROFESSIONAL HEALTH STUDIES

Non-degree

The health professions, such as medicine and dentistry, need individuals with a diversity of educational backgrounds and a wide variety of talents and interests. The philosophies of education, the specific preprofessional course requirements, the noncognitive qualifications for enrollment, and the systems of training vary among the professional health schools; but all recognize the desirability of a broad education—a good foundation in the natural sciences (biology, chemistry, mathematics, and physics), highly developed communication skills, and a solid background in the humanities and social sciences. The absolute requirements for admission to professional health schools are purposely limited to allow latitude for developing individualized undergraduate programs of study; however, almost all schools of medicine and dentistry require 16 semester hours of chemistry, including organic chemistry, eight semester hours of biological sciences, eight semester hours of physics, and at least one course in calculus. These requirements in the natural sciences should be balanced with courses in vocabulary building, the humanities (literature, music, art, history, philosophy), and social sciences (economics, political science, psychology, sociology). The basic requirements in the natural sciences and as many as possible of the courses in the humanities and the social sciences should be completed by the third year of study so that the student will be prepared to take the Dental Admission Test or the Medical College Admission Test prior to making application to a professional school.

Undergraduates may prepare also to study optometry, podiatry, and other health professions. While the basic requirements for these professional schools are essentially the same as those for schools of medicine and dentistry, specific requirements for individual schools in these professions vary somewhat; consequently, the interested student is advised to consult with the chief health professionals advisor.

At Clemson, rather than having a separate, organized preprofessional health study program, it is felt that a student should be allowed to major in any curriculum, so long as the basic entrance requirements of the professional health school are fulfilled. These schools are not so much concerned about a student's major as they are that the student does well in whichever curriculum he or she chooses. Professional health schools have neither preferences nor prejudices concerning any curriculum, which is evidenced by the fact that their entering students represent a broad spectrum of curricula. The emphasis is placed on the student doing well in the curriculum chosen, and this becomes critical as competition increases for the limited number of places available in professional health schools.

PREPHYSICAL THERAPY

Prephysical Therapy is a curriculum designed to meet the requirements of the Physical Therapy program at the Medical University of South Carolina and other schools of physical therapy. This program requires a minimum of 90 semester hours of undergraduate coursework. In addition, the student must apply to the Medical University of South Carolina for acceptance into the program.

Because preparation requires three years, students are advised to select a major with similar requirements after consultation with the Prephysical Therapy advisor. The following curriculum along with an additional 30 hours will fulfill the requirements for the Physical Therapy program at the Medical University of South Carolina and other schools of physical therapy.

First Year

First Semester

- 4 - BIOL 103 General Biology I
 - 4 - CH 101 General Chemistry¹
 - 3 - ENGL 101 Composition I
 - 3 - PSYCH 201 Introduction to Psychology
 - 3-5 - Mathematical Sciences Requirement²
- 17-19

Second Semester

- 4 - BIOL 104 General Biology II
 - 4 - CH 102 General Chemistry
 - 3 - ENGL 102 Composition II
 - 3 - Mathematical Sciences Requirement²
 - 3 - Social Science Requirement¹
- 17

Second Year

First Semester

- 2 - BIOSC 222 Human Anatomy and Phys. I
 - 2 - BIOSC 224 Human Anatomy and Phys. Lab. I
 - 4 - PHYS 207 General Physics I¹
 - 3 - PSYCH 340 Life-Span Develop. Psych. *or*
 - 3 - PSYCH 443 Infant and Child Development
 - 3 - Writing Intensive Requirement¹
 - 3 - Elective
- 17

Second Semester

- 2 - BIOSC 223 Human Anatomy and Phys. II
- 2 - BIOSC 225 Human Anat. and Phys. Lab. II
- 4 - PHYS 208 General Physics II
- 6 - Humanities Requirement
- 3 - Literature Requirement⁴

17

Third Year⁵

90 Total Semester Hours

¹Chemistry requires proficiency in algebra; physics requires proficiency in trigonometry; therefore, entering freshmen must present a score of 550 or above on the Mathematics Achievement Test, Level II or register in the first semester for MTHSC 105.

²Three hours in mathematical science and three hours in statistics (MTHSC 301 or EX ST 301).

³See General Education Requirements.

⁴ENGL 202, 203, 204, 205, 206, 207, 208, 209.

⁵Computer skills, oral communication, and other courses to be selected after consultation with an advisor to a total of at least 90 hours. (See General Education Requirements.)

PREPHARMACY

Prepharmacy is a two-year program. Upon completion of the following curriculum, the student will apply to a college of pharmacy, usually the Medical University of South Carolina or the University of South Carolina. The degree in Pharmacy is awarded by the institution attended. It is important for the student to work closely with the advisor as there are variations in courses required by the pharmacy schools.

First Year**First Semester**

- 4 - BIOL 103 General Biology I
- 4 - CH 101 General Chemistry¹
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - History Requirement²

18

Second Semester

- 4 - BIOL 104 General Biology II
- 4 - CH 112 General Chemistry¹
- 3 - ENGL 102 Composition II
- 3 - History or Economics Requirement²
- 4 - Other Required Courses³

18

Second Year**First Semester**

- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 4 - PHYS 207 General Physics I
- 10 - Other Required Courses³

18

Second Semester

- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 4 - PHYS 208 General Physics II
- 10 - Other Required Courses³

18

72 Total Semester Hours

¹Chemistry requires proficiency in algebra; physics requires proficiency in trigonometry; therefore, entering freshmen must present a score of 550 or above on the Mathematics Achievement Test, Level II or register in the first semester for MTHSC 105.

²Six hours of history are required by the Medical University of South Carolina; three hours each of history and economics are required by the University of South Carolina.

³Courses are to be selected after consultation with an advisor. Six hours of liberal arts or humanities are required by the Medical University of South Carolina; BIOSC 222/224 and 223/225 are required by the University of South Carolina. The University of South Carolina requires two semesters of a foreign language or exemption by examination.

PREVETERINARY MEDICINE

Under a regional plan, the South Carolina Preveterinary Advisory Committee coordinates a program for all South Carolina residents who are interested in pursuing a career in veterinary medicine. South Carolina residents attending any college or university may apply through the South Carolina Advisory Committee to the University of Georgia College of Veterinary Medicine. Currently the University of Georgia admits up to seventeen students each year through arrangements with the Southern Regional Education Board.

Tuskegee University in Alabama has an excellent program in veterinary medicine. Application must be made directly to Tuskegee University. Currently, Tuskegee admits four South Carolina residents.

Minimum requirements for admission to a college of veterinary medicine generally include the satisfactory completion of prescribed courses in a well-rounded undergraduate degree program. Specific requirements for admission to the University of Georgia College of Veterinary Medicine include the following undergraduate courses: six credits of English, 14 credits of humanities and social studies, ten of physics, seven of general biology, seven credits of advanced biology, three credits of biochemistry and 14 credits of organic and inorganic chemistry. (Chemistry and physics courses must be at the premedical level; they may not be survey courses.)

Further, the South Carolina Preveterinary Committee recommends that, to be in the best competitive position, the applicant must complete courses in animal agriculture, genetics, nutrition, biochemistry, and advanced biology subjects. Considerations for selection are character, scholastic achievements, personality, experience with animals, general knowledge, and motivation. In the past, competition has been keen, and only those applicants who have shown exceptional ability have been admitted. Specific considerations may include a minimal grade-point average and completion of standardized tests such as the Graduate Record Examination and the Veterinary College Admission Test.

Since out-of-state students attending Clemson University are ineligible to apply to the University of Georgia or Tuskegee University under the South Carolina quota, they should contact the college(s) of veterinary medicine to which they plan to apply. They may apply at the University of Georgia for at-large admission.

Veterinary schools accept students with a broad range of academic backgrounds; therefore, it is recommended that the beginning university student

select any undergraduate major and simultaneously complete the courses required for veterinary school entrance and those required for completion of a BS or BA degree. For students selecting Animal, Dairy and Veterinary Science, Poultry Science or Biological Sciences at Clemson University, the basic curricula have been designed to accommodate Georgia's entrance requirements. For further information, contact the chairperson of the Preveterinary Medicine Curriculum Committee.

PREPROFESSIONAL STUDIES**Bachelor of Arts****Bachelor of Science**

Clemson University will award the degree of Bachelor of Arts or Bachelor of Science in Preprofessional Studies to a student who is bypassing the bachelors degree while pursuing an advanced degree. The student must have also satisfactorily completed three years of undergraduate work in an appropriate curriculum and the first year of work in an accredited medical, dental, veterinary, law, or other accredited, professional, postgraduate school, provided the student fulfills the requirements for the three-year program as follows and the other specified conditions are met.

1. At least two of the three years of preprofessional work, including the third year, must be taken in residence at this University.

2. A minimum of three years of undergraduate work (i.e. preprofessional school credit) must be presented.

3. Normal progress must have been made toward fulfilling the degree requirements of the curriculum in which the student is enrolled at Clemson.

4. The student applying for the Bachelor of Arts or Bachelor of Science in Preprofessional Studies must be recommended by the college at Clemson in which the curriculum that he/she is majoring as a Clemson student is located or by the college in which three years of normal progress toward a degree can be identified.

5. If the combination of preprofessional work taken and the work in the first year of professional school is equivalent to that which is required in some other bachelor's degree program at Clemson, the college concerned may recommend the other bachelor's degree.

The above requirements and conditions became effective July 1, 1974, and will apply to all students who satisfy these requirements and conditions after that date.

A Clemson student having left the University before receiving the bachelor's degree (prior to July 1, 1974), and having enrolled immediately in an accredited, professional, postgraduate school may apply for a bachelor's degree from Clemson and have his/her application considered on an individual basis. The college(s) at Clemson considering the application are authorized to examine the student's entire record in both preprofessional and professional studies and exercise their own judgment concerning the three-year requirement for Preprofessional Studies.

COLLEGE OF ARCHITECTURE, ARTS AND HUMANITIES

The collaboration of Architecture (Landscape Architecture, Construction Science and Management, City and Regional Planning, and Architecture) with Arts (Visual Arts and Performing Arts) and the Humanities (English, History, Languages, Philosophy and Religion, and Speech and Communication Studies) produces a remarkably rich environment for study. The mixture of core disciplines with applied professions/disciplines in the College provides both depth and breadth in learning. This structure affords students and faculty with skills that address the complex and interconnected challenges of the future, where it is no longer possible for these problems to be solved in a single discipline or profession. It is through the connections and communication between specialized knowledge areas that significant cultural progress will be made. These kinds of thoughts and actions form a fundamental part of the College of Architecture, Arts and Humanities.

To illustrate these ideas, consider the diversity of communication skills practiced and taught in the College. Students learn graphic and artistic communication, technical communication with computers, spoken communication, and communication through the written word. Each skill is vital to a successful student, and it is the collaboration between these forms of communication that prepares students for the complex challenges of the future.

DEGREE PROGRAMS IN THE SCHOOL OF DESIGN AND BUILDING AND THE SCHOOL OF THE ARTS

The undergraduate Design degree program (the Bachelor of Arts in Design or the Bachelor of Science in Design) is the preprofessional preparation for two years of graduate study leading to the professional Master of Architecture degree, which is the fully accredited professional degree in this field. The accredited Bachelor of Science in Construction Science and Management program prepares students for careers as professional managers in the construction industry. A graduate program in Construction Science and Management is also offered in the College leading to the Master of Construction Science and Management. The Fine Arts program offers professional study in the studio visual arts leading to the Bachelor of Fine Arts degree. A graduate program leading to the Master of Fine Arts is also offered. The accredited five-year Bachelor of Landscape Architecture Degree program prepares students for careers as professional landscape architects. A graduate program in City and Regional Planning is housed within the College and accepts graduates from a variety of baccalaureate programs and prepares them for careers in both public and private sector planning through its Master of City and Regional Planning degree.

In addition to the facilities housed in Lee Hall on the Clemson campus, the College offers students the opportunity to study at two off-campus sites. The College has a center at the College of Charleston. It is available to third- and fourth-year architecture and landscape architecture students for a semester's study in Charleston while earning credit from both Clemson University and the College of Charleston. The Charles E. Daniel Center for Building Research and Urban Studies in Genoa, Italy, provides graduate students in the above mentioned programs a semester's residence in an intensive program of study and travel while earning full credit toward their degree.

Entrance Requirements

Admission to degree programs in the School of Design and Building and the School of the Arts is based on academic performance and is limited based on space availability in the various programs. Students wishing admission are advised to make application to the Admissions Office early in the fall of their senior year in high school. They are also encouraged to schedule a personal interview in the College during their senior year, and if possible, bring a portfolio of their creative activities (except Construction Science and Management majors). Prospective students may schedule appointments by calling the individual department.

Policy on Change of Major within or into Degree Programs in the School of Design and Building

When space is available, a student may change majors to one of the degree programs with a 2.5 cumulative grade-point ratio, at least 30 credit hours earned, and design aptitude evidenced by a portfolio review (except Construction Science and Management majors who may initiate a change of major agreement) or by approval of the department chair. The first-year design courses (DSIGN 151, 152, 153 and 154) are available to students transferring into a degree program during the summer terms and are reserved for entering freshmen during fall and spring semesters.

Policy and Advancement in Design

Students enrolled in second-, third- or fourth-year Design studios and theory courses must attain at least a 2.0 grade-point ratio in each year level (by repeating one or both semesters, if necessary) to qualify for advancement to the next year level or in the case of fourth-year Design studios, to qualify for the Design degree, or in Landscape Architecture at the fifth year to qualify for the Bachelor of Landscape Architecture degree.

DEGREE PROGRAMS IN THE SCHOOL OF HUMANITIES

The Bachelor of Arts degree is offered in English, History, Language and International Trade, Modern Languages, Philosophy, and Speech and Communication Studies.

As soon as feasible and not later than the end of the sophomore year, the student seeking the Bachelor of Arts degree in one of the fields listed above, ex-

cept Language and International Trade, will select a minor field of concentration (or a double major with another Bachelor of Arts degree program). Refer to the chart on page 28 for acceptable minors.

To achieve depth as well as breadth in his/her educational experience, a student majoring in English, History, Modern Languages, Philosophy, or Speech and Communication Studies completes at least 24 semester hours from courses above the sophomore level. A student also chooses a minor concentration consisting of at least 15 additional semester hours. Courses satisfying the student's major concentration may not also be included in the minor. A second major concentration (a double major) may substitute for the minor, provided all requirements are fulfilled for each major.

The Bachelor of Arts in English, History, Modern Languages, Philosophy, and Speech and Communication Studies requires 130 total semester credits. Language and International Trade requires 133 semester hours. Of these, at least 12 credits must be earned in humanities courses numbered 300 or higher (A H 210, MUSIC 210 and THEA 210 excepted) and at least 12 credits in social science courses numbered 300 or higher. The humanities for this purpose are considered to include art and architectural history, English (except 304, 312, 314, 316, 331, 333, 334, 335, 485, 490, 495), languages, music, philosophy, religion, speech (except 362 and 364), theatre (except 377, 387, and 397), and women's studies, as well as courses entitled humanities. The social sciences for this purpose are considered to include agricultural and applied economics, anthropology, economics, geography, history, political science, psychology, and sociology.

Students enrolled in degree programs offered in the humanities who expect to teach in the public schools may elect education courses required for teaching certificates by the South Carolina State Department of Education. Such courses are to be approved by their own department advisors.

The following courses are not approved for graduation credit for the above majors: ENGL 100, MTHSC 115, 116, 215, 216.

ARCHITECTURE

Architects have a creative responsibility of designing the buildings which shape our physical environment. To understand the humanistic, economic and technological nature of environmental problems, students must have a sound general education. Subsequent professional education must be preparation for a life of continuing change in which the problems to be solved will be large and small, for every sort of function, in every type of climate and for every condition of budget.

Architectural Registration/Licensure

Most states require that an individual intending to become an architect hold an accredited degree. There are two types of degrees that are accredited by the National Architectural Accrediting Board: (1) the Bachelor of Architecture, which requires a minimum of five years of study, and (2) the Master of Architecture, which requires a minimum of three years of study following an unrelated bachelor's degree or two years following a related preprofes-

sional bachelor's degree. The professional degrees are structured to educate those who aspire to registration/licensure as architects.

The four-year preprofessional degree, where offered, is not accredited by NAAB; it is useful for those wishing a foundation in the field of architecture, as preparation for either continued education in a professional degree program, or for employment options in architecturally related areas.

Bachelor of Arts in Design

Freshman Year

First Semester

- 3 - DESIGN 151 Design Studies I
- 1 - DESIGN 153 Design Theory I
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I¹
- 4 - PHYS 207 General Physics I²
- 3 - Humanities Requirement³

18

Second Semester

- 3 - A A H 102 Survey of Art and Arch. History II
- 3 - DESIGN 152 Design Studies II
- 1 - DESIGN 154 Design Theory II
- 3 - ENGL 102 Composition II
- 3 - MTHSC 301 Stat. Theory and Methods I¹
- 4 - PHYS 208 General Physics II²
- 1 - Elective

18

Sophomore Year

First Semester

- 3 - A A H 203 History and Theory of Arch. I
- 3 - C S M 201 Structures I
- 3 - CP SC 120 Issues in Computers
- 5 - DESIGN 251 Design Studies III
- 1 - DESIGN 253 Design Theory III
- 3 - ART⁴

18

Second Semester

- 3 - A A H 204 History and Theory of Arch. II
- 3 - C S M 202 Structures II
- 5 - DESIGN 252 Design Studies IV
- 1 - DESIGN 254 Design Theory IV
- 3 - ART⁴
- 3 - Social Science Requirement⁵

18

Junior Year

First Semester

- 3 - C S M 301 Structures III
- 5 - DESIGN 351 Design Studies V
- 1 - DESIGN 353 Design Theory V
- 4 - Foreign Language Requirement⁶
- 3 - Writing Intensive Requirement⁷
- 3 - Elective

19

Second Semester

- 3 - C S M 302 Structures IV
- 5 - DESIGN 352 Design Studies VI
- 1 - DESIGN 354 Design Theory VI
- 4 - Foreign Language Requirement⁶
- 3 - Oral Communication Requirement⁷
- 3 - Elective

19

Senior Year

First Semester

- 3 - C S M 304 Environmental Systems I
- 5 - DESIGN 451 Design Studies VII
- 1 - DESIGN 453 Design Theory VII
- 3 - Foreign Language Requirement⁶
- 3 - Major Studies Requirement
- 3 - Elective

18

Second Semester

- 3 - C S M 403 Environmental Systems II
- 5 - DESIGN 452 Design Studies VIII
- 1 - DESIGN 454 Design Theory VIII
- 3 - Foreign Language Requirement⁶
- 3 - Major Studies Requirement
- 3 - Social Science Requirement⁵

18

146 Total Semester Hours

¹A sequence of MTHSC 101, 203 and 102 will be accepted in lieu of MTHSC 106 and 301.

²With consent of advisor, BIOL 103, 104; CH 101, 102; GEOL 101, 102 may be substituted for PHYS 207 and 208.

³See advisor.

⁴ART 205, 207, 209, 211, 213, 215, 217, 219.

⁵See General Education Requirements.

⁶With consent of advisor, modern language may be taken in the freshman and sophomore years.

⁷Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)

⁸See General Education Requirements E.1.

Note: MTHSC 105 will not count toward elective credit for a degree in Design.

Bachelor of Science in Design

Freshman Year

First Semester

- 3 - DESIGN 151 Design Studies I
- 1 - DESIGN 153 Design Theory I
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I¹
- 4 - PHYS 207 General Physics I
- 3 - Humanities Requirement²

18

Second Semester

- 3 - A A H 102 Survey of Art and Arch. History II
- 3 - DESIGN 152 Design Studies II
- 1 - DESIGN 154 Design Theory II
- 3 - ENGL 102 Composition II
- 3 - MTHSC 301 Stat. Theory and Methods I¹
- 4 - PHYS 208 General Physics II
- 1 - Elective

18

Sophomore Year

First Semester

- 3 - A A H 203 History and Theory of Arch. I
- 3 - C S M 201 Structures I
- 3 - CP SC 120 Issues in Computers
- 5 - DESIGN 251 Design Studies III
- 1 - DESIGN 253 Design Theory III
- 3 - ART⁴

18

Second Semester

- 3 - A A H 204 History and Theory of Arch. II
- 3 - C S M 202 Structures II
- 5 - DESIGN 252 Design Studies IV
- 1 - DESIGN 254 Design Theory IV
- 3 - ART³
- 3 - Humanities Requirement⁴

18

Junior Year

First Semester

- 3 - C S M 301 Structures III
- 5 - DESIGN 351 Design Studies V
- 1 - DESIGN 353 Design Theory V
- 3 - Social Science Requirement⁵
- 3 - Writing Intensive Requirement⁶
- 3 - Elective

18

Second Semester

- 3 - C S M 302 Structures IV
- 5 - DESIGN 352 Design Studies VI
- 1 - DESIGN 354 Design Theory VI
- 3 - DESIGN 353 Design Theory V
- 3 - Oral Communication Requirement⁶
- 3 - Elective

18

Senior Year

First Semester

- 3 - C S M 304 Environmental Systems I
- 5 - DESIGN 451 Design Studies VII
- 1 - DESIGN 453 Design Theory VII
- 3 - Major Studies Requirement
- 3 - Social Science Requirement⁵
- 3 - Elective

18

Second Semester

- 3 - C S M 403 Environmental Systems II
- 5 - DESIGN 452 Design Studies VIII
- 1 - DESIGN 454 Design Theory VIII
- 9 - Major Studies Requirement

18

144 Total Semester Hours

¹A sequence of MTHSC 101, 203 and 102 will be accepted in lieu of MTHSC 106 and 301.

²See advisor.

³ART 205, 207, 209, 211, 213, 215, 217, 219.

⁴Humanities E.1 Requirement—ENGL 202/H202, 203/H203, 204/H204, 205/H205, 206/H206, 207/H207, 208/H208, 209/H209, H210.

⁵See General Education Requirements.

⁶Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)

Note: MTHSC 105 will not count toward elective credit for a degree in Design.

CONSTRUCTION SCIENCE AND MANAGEMENT

Bachelor of Science

As the largest single industry in the United States and one of the most important, construction offers unlimited opportunities to highly motivated and professionally educated young men and women. Future professionals must be skilled in managing people, equipment, and capital, coupled with a grasp of construction materials and methods and the complex technologies of modern construction. The Bachelor of Science in Construction Science and Management curriculum is the basis for either a career in construction or as a developer or building management specialist.

Freshman Year

First Semester

- 3 - DSIGN 151 Design Studies I
- 1 - DSIGN 153 Design Theory I
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable¹
- 4 - PHYS 207 General Physics I
- 3 - Humanities Requirement²

18

Second Semester

- 4 - C S M 100 Introduction to Construction Science and Management
- 3 - ENGL 102 Composition II
- 3 - MTHSC 301 Stat. Theory and Methods I¹
- 4 - PHYS 208 General Physics II
- 4 - Elective

18

Sophomore Year

First Semester

- 3 - C S M 201 Structures I
- 3 - C S M 203 Materials and Methods of Const.
- 3 - CP SC 120 Issues in Computers
- 3 - ECON 211 Principles of Microeconomics
- 3 - Literature Requirement³
- 3 - Elective

18

Second Semester

- 3 - C E 201 Surveying
- 3 - C S M 202 Structures II
- 3 - C S M 204 Contract Documents
- 3 - ECON 212 Principles of Macroeconomics
- 3 - Oral Communication Requirement⁴
- 3 - Elective

18

Junior Year

First Semester

- 3 - C S M 301 Structures III
- 3 - C S M 351 Construction Estimating
- 3 - MGT 307 Personnel Management
- 3 - ART⁵
- 3 - Writing Intensive Requirement⁶
- 3 - Elective

18

Second Semester

- 3 - ACCT 203 Financial Accounting
- 3 - C S M 302 Structures IV
- 3 - C S M 303 Soils and Foundations
- 3 - C S M 304 Environmental Systems I
- 3 - C S M 352 Construction Scheduling
- 3 - LAW 322 Legal Environment of Business

18

Senior Year

First Semester

- 3 - C S M 401 Formwork and Placing Concrete
- 3 - C S M 453 Construction Project Management
- 3 - C S M 461 Construction Economics Seminar
- 6 - Major Requirement⁷

15

Second Semester

- 3 - C S M 402 Construction Equipment and Safety Management
- 6 - C S M 454 Construction Capstone
- 0 - C S M 491 Construction Science and Management Internship
- 6 - Major Requirement⁷

15

138 Total Semester Hours

¹A sequence of MTHSC 101, 102 and 203 will be accepted in lieu of MTHSC 106 and 301.

²See advisor.

³ENGL 202, 203, 204, 205, 206, 207, 208, 209.

⁴SPCH 150, 250.

⁵ART 205, 207, 209, 211, 213, 215, 217, 219.

⁶Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)

⁷Select from approved departmental list or as approved in writing by advisor and department chair.

Note: A minimum of 800 hours of construction experience will be required prior to graduation.

ENGLISH

Bachelor of Arts

The purposes of a major in English are to help students acquire an understanding of our literary heritage; develop an appreciation and practical knowledge of the modes of literary expression, research, and criticism; improve the ability to write effectively and intelligently; gain insights into literature as a humane study; and prepare for advanced work in English language, literature, and related disciplines.

The program of study for a major concentration in English consists of courses stipulated in the basic curriculum¹ for the Bachelor of Arts and 25 semester credits of English, arranged as follows:

Group I—ENGL 190 and 411.

Group II—Three credits from ENGL 405, 407, 408, 409, 410, 412, 413, 414.

Group III—Three credits from ENGL 406, 415, 416, 417, 418.

Group IV—Three credits from ENGL 422, 423, 424, 425.

Group V—Three credits from ENGL 300, 400, 401, 435, 491, 492.

Group VI—Nine additional credits from 300- and 400-level courses, at least six credits from the 400 level.²

The department requires proficiency in composition for all of its majors and minors. English majors or minors with writing problems must overcome them in the Writing Laboratory.

English majors must complete one of the following sequences of courses: HIST 361, 363; 316, 361; 316, 363; or 316, 365.

English majors must also fulfill a requirement in philosophy or religious studies by completing one of the following courses: PHIL 101, 102, 103, REL 101, 102.

English majors must also fulfill a fine arts requirement by completing one of the following courses: A A H 101, 210, ENGL 357, HUM 301, 302, 306, MUSIC 210, 311, 315, 316, THEA 210.

Electives are added as necessary to meet the minimum number of 130 credits for graduation.

¹The Department suggests that English majors take ENGL 203 and 204 or 207 and 208 to satisfy the sophomore literature requirement.

²No course may be used toward the satisfaction of both major and minor requirements.

BASIC CURRICULUM

Freshman Year

First Semester

- 3 - ENGL 101 Composition I
- 3 - HIST 172 Western Civilization
- 3 - MTHSC 101 Introduction to Probability¹
- 4 - Foreign Language Requirement
- 4 - Science Requirement²

17

Second Semester

- 3 - ENGL 102 Composition II
- 3 - HIST 173 Western Civilization
- 3 - MTHSC 102 Intro. to Mathematical Analysis¹
- 4 - Foreign Language Requirement
- 4 - Science Requirement²

17

Sophomore Year

First Semester

- 3 - CP SC 120 Issues in Computers
- 3 - Foreign Language Requirement
- 3 - Literature Requirement³
- 3 - Major and Minor Areas
- 6 - Elective

18

Second Semester

- 3 - Foreign Language Requirement
- 3 - Literature Requirement³
- 10 - Major and Minor Areas

16

Junior Year

First Semester

- 9 - Major and Minor Areas
- 3 - Oral Communication Requirement⁴
- 3 - Writing Intensive Requirement⁴

15

Second Semester

- 12 - Major and Minor Areas
- 3 - Elective
- 15

Senior Year**First Semester**

- 9 - Major and Minor Areas
- 8 - Elective
- 17

Second Semester

- 9 - Major and Minor Areas
- 6 - Advanced Social Science Requirement²
- 15

130 Total Semester Hours

¹Students may pursue alternate sequences such as the following: MTHSC 101 and 106 or 203, 102 and 207; or 106 and 108, 207, or 301.

²A two-semester sequence of the same physical or biological science (astronomy, biology, chemistry, geology, or physics) totaling at least eight semester credits, including the appropriate laboratory course.

³ENGL 202/H202, 203/H203, 204/H204, 205/H205, 206/H206, 207/H207, 208/H208, 209/H209, and H210.

⁴See General Education Requirements.

⁵See advisor.

FINE ARTS**Bachelor of Fine Arts**

The Bachelor of Fine Arts degree is offered to a limited number of students interested in a balanced curriculum of academic coursework with studio art and art history courses. It is the recognized professional degree in the visual arts leading to careers in the visual arts that demand study in drawing, painting, sculpture, printmaking, photography, and ceramics.

Students begin to concentrate their studio coursework in a specific area of the visual arts in the junior year in preparation for their senior studio. This is most significant coursework in the curriculum as it is a time in which concepts and skills are focused and developed to produce a cohesive body of artwork and a portfolio for graduate study and professional application.

Freshman Year**First Semester**

- 3 - ART 205 Beginning Drawing
- 3 - DSIGN 151 Design Studies I
- 1 - DSIGN 153 Design Theory I
- 3 - ENGL 101 Composition I
- 3 - MTHSC 101 Introduction to Probability
- 3 - Humanities Requirement¹
- 16

Second Semester

- 3 - A A H 102 Survey of Art and Arch. History II
- 3 - ART 207 Beginning Painting
- 3 - DSIGN 152 Design Studies II
- 1 - DSIGN 154 Design Theory II
- 3 - ENGL 102 Composition II
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 16

Sophomore Year**First Semester**

- 3 - A A H 205 History and Theory of Art I
- 3 - ART 209 Beginning Sculpture
- 3 - ART 211 Beginning Printmaking
- 3 - Computer Skills Requirement²
- 4 - Science Requirement³
- 16

Second Semester

- 3 - A A H 206 History and Theory of Art II
- 3 - ART 213 Beginning Photography
- 3 - ART 217 Beginning Ceramics
- 3 - ART 305 Drawing
- 4 - Science Requirement³
- 16

Junior Year**First Semester**

- 3 - A A H 305 Contemporary Art History
- 6 - ART 300/400
- 3 - Studio Requirement⁴
- 3 - Writing Intensive Requirement⁵
- 3 - Elective
- 18

Second Semester

- 6 - ART 300/400
- 3 - Literature Requirement⁶
- 3 - Oral Communication Requirement⁷
- 3 - Studio Requirement⁴
- 3 - Elective
- 18

Senior Year**First Semester**

- 3 - ART 300/400
- 5 - ART 471 BFA Senior Studio I
- 3 - Social Science Requirement⁸
- 3 - Studio Requirement⁴
- 3 - Elective
- 17

Second Semester

- 3 - ART 300/400
- 5 - ART 472 BFA Senior Studio II
- 3 - Social Science Requirement⁸
- 3 - Studio Requirement⁴
- 3 - Elective
- 17

134 Total Semester Hours

¹See advisor.

²As listed under "B" of the General Education Requirements.

³As listed under "D" of the General Education Requirements.

⁴All ART courses and other courses approved by the major advisor.

⁵As listed under "A.3" of the General Education Requirements.

⁶As listed under "E.1" of the General Education Requirements.

⁷As listed under "A.2" of the General Education Requirements.

⁸As listed under "F" of the General Education Requirements.

HISTORY**Bachelor of Arts**

The recommended program of study consists of the required courses in the basic Bachelor of Arts curriculum, plus GEOG 103 or GEOG 220, and 30 additional credits in history, including two courses at the 400 level, selected with the advice and consent of a departmental advisor and arranged to suit the academic interests of the student. Additional electives are added as needed to meet the minimum of 130 semester credits required for graduation.

Pre-law students majoring in History should consult the departmental advisor for a recommended program.

BASIC CURRICULUM**Freshman Year****First Semester**

- 3 - ENGL 101 Composition I
- 3 - HIST 172 Western Civilization
- 3 - MTHSC 101 Introduction to Probability¹
- 4 - Foreign Language Requirement
- 4 - Science Requirement²
- 17

Second Semester

- 3 - ENGL 102 Composition II
- 3 - HIST 173 Western Civilization
- 3 - MTHSC 102 Intro. to Mathematical Analysis¹
- 4 - Foreign Language Requirement
- 4 - Science Requirement²
- 17

Sophomore Year**First Semester**

- 3 - Computer Skills Requirement³
- 3 - Foreign Language Requirement
- 3 - Literature Requirement⁴
- 9 - Major and Minor Areas
- 18

Second Semester

- 6 - Advanced Humanities Requirement³
- 3 - Foreign Language Requirement
- 3 - Literature Requirement⁴
- 4 - Elective
- 16

Junior Year**First Semester**

- 9 - Major and Minor Areas
- 3 - Writing Intensive Requirement³
- 3 - Elective
- 15

Second Semester

- 12 - Major and Minor Areas
- 3 - Oral Communication Requirement³
- 15

Senior Year**First Semester**

- 9 - Major and Minor Areas
- 8 - Elective
- 17

Second Semester

- 9 - Major and Minor Areas
6 - Elective
15

130 Total Semester Hours

¹Students may pursue alternate sequences such as the following: MTHSC 101 and 106 or 203; 102 and 207; or 106 and 108, 207, 210, 301, 308.

²A two-semester sequence of the same physical or biological science (astronomy, biology, chemistry, geology, or physics) totaling at least eight semester credits, including the appropriate laboratory course.

³See General Education Requirements.

⁴ENGL 202/H202, 203/H203, 204/H204, 205/H205, 206/H206, 207/H207, 208/H208, 209/H209, and H210.

⁵See advisor.

LANDSCAPE ARCHITECTURE

Bachelor of Landscape Architecture

As practicing professionals, landscape architects base their land area design plans on very high aesthetic standards and a keen awareness of the environmental and cultural context of the site. Landscape architects are active in the design of regional and city plans, urban designs, urban plazas, city parks and playgrounds, athletic fields, marinas, and other recreational areas. They design housing areas of all types, industrial and office parks, medical and academic campuses, parkways and bike ways, courtyards and backyards.

To succeed in landscape architecture, one must first be a "maker," someone who enjoys creating something new or recreating something old. He/she must also see the study of landscape architecture as a way to make the environment better through an enlightened application of design on the land.

The five-year program leads to the professional degree, Bachelor of Landscape Architecture. Students can use the professional support requirement to tailor the degree to an area of specialization such as construction, architecture, horticulture, business, etc. Following completion of the degree, most states require a two or three year work experience before taking the professional license examination.

Freshman Year**First Semester**

- 3 - A A H 101 Survey of Art and Arch. History I
3 - DSGN 151 Design Studies I
1 - DSGN 153 Design Theory I
3 - ENGL 101 Composition I
3 - GEOL 101 Physical Geology¹
1 - GEOL 103 Physical Geology Lab.
3 - MTHSC 102 Intro. to Mathematical Analysis
17

Second Semester

- 3 - A A H 102 Survey of Art and Arch. History II
3 - DSGN 152 Design Studies II
1 - DSGN 154 Design Theory II
3 - ENGL 102 Composition II
3 - EX ST 301 Introductory Statistics²
3 - GEOL 112 Earth Resources
1 - GEOL 114 Earth Resources Lab.
1 - Elective
18

Sophomore Year**First Semester**

- 3 - A A H 416 History of Landscape Architecture
3 - AG M 301 Soil and Water Conservation
5 - DSGN 251 Design Studies III
1 - DSGN 253 Design Theory III
3 - HORT 101 Horticulture
3 - Humanities Requirement³
18

Second Semester

- 3 - C E 201 Surveying
5 - DSGN 252 Design Studies IV
1 - DSGN 254 Design Theory IV
3 - Computer Skills Requirement⁴
3 - Humanities Requirement³
3 - Writing Intensive Requirement⁵
18

Junior Year**First Semester**

- 3 - HORT 303 Plant Materials
6 - LARCH 351 Landscape Architecture Design I
3 - LARCH 362 Landscape Arch. Technology II
3 - ART Requirement⁶
3 - Social Science Requirement⁷
18

Second Semester

- 4 - HORT 461 Problems in Landscape Design
6 - LARCH 352 Landscape Arch. Design II
3 - Oral Communication Requirement⁸
3 - Social Science Requirement⁷
2 - Elective
18

Senior Year⁹**First Semester**

- 6 - LARCH 451 Landscape Arch. Design III
6 - LARCH 462 Landscape Arch. Technology III
6 - Elective
15

Second Semester

- 6 - LARCH 452 Landscape Arch. Design IV¹⁰
3 - LARCH 581 Landscape Architectural Professional Practice³
3 - ART Requirement⁶
3 - Elective
15

Professional Year¹¹**First Semester**

- 15 - Professional Support Requirement¹²
15

Second Semester

- 6 - LARCH 552 Professional Landscape Architectural Design
2 - LARCH 562 Landscape Arch. Technology IV
7 - Professional Support Requirement¹²
15

167 Total Semester Hours

¹BIOL 103 and 104; PHYS 207 and 208; or CH 105 and 106.

²MTHSC 301 may be taken in lieu of EX ST 301.

³See General Education Humanities Requirement.

⁴See General Education Computer Skills Requirement.

⁵See General Education Writing Intensive Requirement.

⁶ART 205, 207, 209, 211, 213, 215, 217.

⁷See General Education Social Science Requirement.

⁸See General Education Oral Communication Requirement.

⁹Students may petition to graduate at the end of their senior year with a subprofessional BA or BS in Design degree. Students earning credit for four semesters of the same modern language may elect to receive the BA in Design. Note that only one degree in Design will be awarded.

¹⁰Exceptional students may be permitted to spend this semester at the Architecture Center in Charleston.

¹¹Exceptional students may be permitted to spend this semester at the Daniel Center in Genoa, Italy.

¹²Select from approved departmental list or as approved in writing by advisor and department chair.

LANGUAGE AND INTERNATIONAL TRADE

Bachelor of Arts

The purpose of the Language and International Trade program is to help students acquire a basic use of the four language skills (listening, reading, speaking, and writing); a familiarity with specific peoples, cultures, literatures and business environments; and the knowledge and skills to pursue graduate studies or careers in business.

The Bachelor of Arts program in Language and International Trade combines foreign languages and international trade. Students choose one language (French, German, or Spanish) and one professional option: Applied International Economics, Forest Products, International Trade, Textiles, or Tourism.

A summer internship between the junior and senior years gives students the opportunity to apply classroom learning to a business/industrial work environment. Language and International Trade majors are also encouraged to participate in Study Abroad programs to increase their language proficiency.

Students should confer with the Language and International Trade director for specific course requirements involving the various language options and the chosen professional concentration.

Language and International Trade majors with the International Trade option take MTHSC 102 or 106, and 207 or 210, and 301.

The 133 semester-hour curriculum, which includes at least 24 hours at the 300-400 level in the language track and also in the professional concentration, is outlined below.

The language component emphasizes speaking and writing skills, culture, civilization, and business/technical languages. Students are required to take the courses listed under one of the following languages:

French—102, 201, 202, 305, 307 or 308, 316, 411, 416, plus nine credits of French courses at the 300-400 level as specified on the departmental advising sheets; L&IT 127; and L&IT 400, 401, or 402.
German—102, 201, 202 or 251, 305, 308 or 309 or 413, 316, 411, 416, plus nine credits of German courses at the 300-400 level as specified on the departmental advising sheets; L&IT 127; and L&IT 400, 401, or 402.

Spanish—102, 201, 202, 305, 307 or 308 or 435, 316, 411, 416, plus nine credits of Spanish courses at the 300-400 level as specified on the departmental advising sheets; L&IT 127; and L&IT 400, 401, or 402.

The professional component emphasizes international marketing in areas important to the economy of the state and the nation. Students are required to take the courses listed under one of the following professional options:

Applied International Economics—ACCT 203, AGRIC 401, AP EC 202, 409, 420, ECON 212, 310 or 412, ENGL 316, EX ST 462, MGT 423, MKT 301 or AGRIC 301, MKT 427.

Forest Products—ECON 211, 310 or 412, ENGL 316, FOR 311, 324, 419, 420, 422, MKT 301, 427.

International Trade—ACCT 203, ECON 211, 310 or 412, ENGL 316, FIN 306, LAW 322, MGT 301, 418, 424, MKT 301, 427, MTHSC 301.

Textiles—ECON 211, 310 or 412, ENGL 316, MKT 301, 423, 427, TEXT 308, 314, 322, 460, 472 or 475.

Tourism—ECON 211, 310 or 412, ENGL 316, MKT 301, 423, 427, PRMT 342, 343, 444, 447, plus three additional credits in PRMT at the 300-400 level, approved by the Language and International Trade director, preferably PRMT 441 or 443.

Department requirements for all options include three credits from art and architectural history, music, or theatre (practica with approval of department chair).

In addition, students will be required, as a condition of graduation, to pass a noncredit examination to determine their language competency. The examination will be taken in the student's last full semester at the University.

MODERN LANGUAGES

Bachelor of Arts

The purpose of the Bachelor of Arts degree in Modern Languages is to help students acquire a basic use of the four language skills (listening, reading, speaking, and writing); a familiarity with specific peoples, cultures and literatures; and the knowledge and foreign-language skills to pursue graduate studies or careers in education or business.

A student may elect a major concentration in a single language, a double major in two languages, or a double major combining a language major with a Bachelor of Arts major outside the department. All Modern Language majors will choose one of the following options:

Option A—Designed to prepare the student to continue education in graduate school or to provide background for other professional language careers.

Option B—Designed to prepare for teaching in secondary schools, Option B requires the courses specified below plus coursework in education to meet certification requirements.

Option C—Designed to prepare the student for a career in business. Modern Language majors seeking employment with multinational firms in the United States and overseas, or pursuing graduate degrees in international business studies, economics, or agricultural economics may have one of the following:

- a double major with Economics.
- a Cluster minor in Administration.
- a minor in Accounting or Spanish-American Area Studies.

Option D—Designed to permit students to obtain a double major by combining either French, German or Spanish with any other major in any Bachelor of Arts degree program in the University. All requirements for each major must be fulfilled.

All Modern Language majors must complete the stipulated courses in the basic Bachelor of Arts curriculum.

French—All options require FR 305 and 309 plus 24 additional credits in French at the 300-400 level appropriate to the option and approved by the chair of the department. Option A requires six credits of 400-level literature courses, and Options B and C require six credits in literature courses, of which three credits must be at the 400 level.

German—All options require 24 credits in German at the 300-400 level appropriate to the option and approved by the chair of the department.

Spanish—All options require 30 credits at the 300-400 levels, of which nine hours must be at the 400 level. A minimum of six hours of literature, including one course at the 400 level, is also required.

Department requirements for all options—three credits from art and architectural history, music, or theatre (practica with approval of department chair).

In addition, students will be required, as a condition of graduation, to pass a noncredit examination to determine their language competency. The examination will be taken in the student's last full semester at the University.

BASIC CURRICULUM

Freshman Year

First Semester

- ENGL 101 Composition I
- HIST 172 Western Civilization
- MTHSC 101 Introduction to Probability¹
- Foreign Language Requirement
- Science Requirement²

17

Second Semester

- ENGL 102 Composition II
- HIST 173 Western Civilization
- MTHSC 102 Intro. to Mathematical Analysis¹
- Foreign Language Requirement
- Science Requirement²

17

Sophomore Year

First Semester

- Computer Skills Requirement¹
- Foreign Language Requirement
- Literature Requirement⁴
- Elective

18

Second Semester

- Foreign Language Requirement
- Literature Requirement⁴
- Elective

16

Junior Year

First Semester

- Major and Minor Areas
- Oral Communication Requirement³
- Elective

15

Second Semester

- Major and Minor Areas
- Writing Intensive Requirement³

15

Senior Year

First Semester

- Major and Minor Areas
- Elective

17

Second Semester

- Major and Minor Areas
- Elective

15

130 Total Semester Hours

¹Students may pursue alternate sequences such as the following: MTHSC 101 and 106 or 203; 102 and 207; or 106 and 108, 207, 301.

²A two-semester sequence of the same physical or biological science (astronomy, biology, chemistry, geology, or physics) totaling at least eight semester credits, including the appropriate laboratory course.

³Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)

⁴ENGL 202/H202, 203/H203, 204/H204, 205/H205, 206/H206, 207/H207, 208/H208, 209/H209, and H210.

PHILOSOPHY

Bachelor of Arts

The total number of semester credits required for the Bachelor of Arts in Philosophy is 130. Of these at least 12 credits must be earned in humanities courses numbered 300 or higher and at least 12 credits must be earned in social science courses numbered 300 or higher.

The required course of study will consist of the basic Bachelor of Arts curriculum, one philosophy course at the 100 level, both PHIL 315 and 316, and 24 additional credits in philosophy courses numbered 300 or higher, including either PHIL 401 or PHIL 402. Additional electives are added as needed to meet the minimum of 130 semester credits required for graduation.

Pre-law and Pre-med students majoring in Philosophy should consult the departmental advisor for help in tailoring the program to their needs.

BASIC CURRICULUM

Freshman Year

First Semester

- ENGL 101 Composition I
- HIST 172 Western Civilization
- MTHSC 101 Introduction to Probability¹
- Foreign Language Requirement
- Science Requirement²

17

Second Semester

- 3 - ENGL 102 Composition II
- 3 - HIST 173 Western Civilization
- 3 - MTHSC 102 Intro. to Mathematical Analysis¹
- 4 - Foreign Language Requirement
- 4 - Science Requirement²

17

Sophomore Year**First Semester**

- 3 - Foreign Language Requirement
- 3 - Literature Requirement¹
- 3 - Oral Communication Requirement⁴
- 9 - Major and Minor Areas

18

Second Semester

- 3 - Computer Skills Requirement⁴
- 3 - Foreign Language Requirement
- 3 - Literature Requirement¹
- 7 - Elective

16

Junior Year**First Semester**

- 9 - Major and Minor Areas
- 3 - Writing Intensive Requirement⁴
- 3 - Elective

15

Second Semester

- 12 - Major and Minor Areas
- 3 - Elective

15

Senior Year**First Semester**

- 11 - Major and Minor Areas
- 6 - Advanced Social Sciences Requirement⁵

17

Second Semester

- 9 - Major and Minor Areas
- 6 - Advanced Social Sciences Requirement⁵

15

130 Total Semester Hours

¹Students may pursue alternate sequences such as the following: MTHSC 101 and 106 or 203; 102 and 207; or 106 and 108, 207, or 301.

²A two-semester sequence of the same physical or biological science (astronomy, biology, chemistry, geology, or physics) totaling at least eight semester credits, including the appropriate laboratory course.

³ENGL 202/H202, 203/H203, 204/H204, 205/H205, 206/H206, 207/H207, 208/H208, 209/H209, and H210.

⁴See General Education Requirements.

⁵See advisor.

SPEECH AND COMMUNICATION STUDIES

Bachelor of Arts

Speech and Communication Studies examines communication in a variety of contexts: interpersonal, social, and family relationships; small groups and organizations; cross-cultural situations; and mass media. The purpose of the Bachelor of Arts in Speech and Communication Studies is to provide a thoroughly integrated yet individual degree program that will prepare students for careers in business, government and the public sphere.

Speech 150 is required of all Speech and Communication Studies majors.

I. Required Communication Core Courses (6 hours)

- SPCH 300 Communication in a World Context
- SPCH 301 Speech Communication Theories

II. Distributive Requirements (One course must be selected from each pair or trio; additional courses taken from each pair or trio may be used to satisfy elective requirements.) (15 hours)

- SPCH 250 Public Speaking
- SPCH 251 Business and Professional Speaking

- SPCH 348 Interpersonal Communication
- SPCH 350 Small Group and Team Comm.
- SPCH 364 Organizational Communication

- SPCH 330 Nonverbal Communication
- SPCH 455 Gender Communication

- SPCH 360 Persuasion
- SPCH 361 Argumentation and Debate

- SPCH 365 Mass Comm.: History and Criticism
- SPCH 491 Classical Rhetoric
- SPCH 492 Modern Rhetoric

III. Speech and Communication Studies Electives (9 hours)

Any 300- or 400-level Speech and Communication Studies course. Additional courses taken under the Distributive Requirements (above) may also be used to fulfill the Electives Requirement. ENGL 357 (Film) may be taken in lieu of one 300- or 400-level elective Speech and Communication Studies course.

30 total hours

Advanced Social Science Requirement (12 hours)

Electives as needed to complete 130 hours

BASIC CURRICULUM**Freshman Year****First Semester**

- 3 - ENGL 101 Composition I
- 3 - HIST 172 Western Civilization
- 4 - Foreign Language Requirement
- 3 - Mathematical Science Requirement¹
- 4 - Science Requirement²

17

Second Semester

- 3 - ENGL 102 Composition II
- 3 - HIST 173 Western Civilization
- 4 - Foreign Language Requirement
- 3 - Mathematical Science Requirement¹
- 4 - Science Requirement²

17

Sophomore Year**First Semester**

- 3 - SPCH 150 Intro. to Speech Communication
- 3 - Computer Skills Requirement¹
- 3 - Foreign Language Requirement
- 3 - Literature Requirement³
- 6 - Elective

18

Second Semester

- 3 - Advanced Social Science Requirement⁴
- 3 - Foreign Language Requirement
- 3 - Literature Requirement³
- 7 - Elective

16

Junior Year**First Semester**

- 3 - Advanced Social Science Requirement⁴
- 9 - Major and Minor Areas
- 3 - Writing Intensive Requirement¹

15

Second Semester

- 15 - Major and Minor Areas

15

Senior Year**First Semester**

- 3 - Advanced Social Science Requirement⁴
- 12 - Major and Minor Areas
- 2 - Elective

17

Second Semester

- 3 - Advanced Social Science Requirement⁴
- 9 - Major and Minor Areas
- 3 - Elective

15

130 Total Semester Hours

¹See General Education Requirements.

²A two-semester sequence of the same physical or biological science (astronomy, biology, chemistry, geology, or physics) totaling at least eight semester credits, including the appropriate laboratory course.

³ENGL 202/H202, 203/H203, 204/H204, 205/H205, 206/H206, 207/H207, 208/H208, 209/H209, and H210.

⁴Any 300-400 level social science courses listed under General Education Requirements.

COLLEGE OF BUSINESS AND PUBLIC AFFAIRS

The College of Business and Public Affairs includes the following academic programs: the School of Accountancy and Legal Studies; the School of Business and Leadership which includes the Departments of Aerospace Studies, Economics, Finance, Graphic Communications, Management, Marketing, Military Science, and the MBA Program; and the School of Social Science which contains the Departments of Political Science, Psychology, and Sociology.

PREPROFESSIONAL STUDIES

Clemson University will award the degree of Bachelor of Arts or Bachelor of Science in Preprofessional Studies to a student who is bypassing the bachelors degree while pursuing an advanced degree. The student must have also satisfactorily completed three years of undergraduate work in an appropriate curriculum and the first year of work in an accredited medical, dental, veterinary, law, or other accredited, professional, postgraduate school, provided the student fulfills the requirements for the three-year program as follows and the other specified conditions are met.

1. At least two of the three years of preprofessional work, including the third year, must be taken in residence at this University.

2. A minimum of three years of undergraduate work (i.e. preprofessional school credit) must be presented.

3. Normal progress must have been made toward fulfilling the degree requirement of the curriculum in which the student is enrolled at Clemson.

4. The student applying for the Bachelor of Arts or Bachelor of Science in Preprofessional Studies must be recommended by the college at Clemson in which the curriculum that he/she is majoring as a Clemson student is located or by the college in which three years of normal progress toward a degree can be identified.

5. If the combination of preprofessional work taken and the work in the first year of professional school is equivalent to that which is required in some other bachelor's degree program at Clemson, the college concerned may recommend the other bachelor's degree.

The above requirements and conditions became effective July 1, 1974, and will apply to all students who satisfy these requirements and conditions after that date.

A Clemson student having left the University before receiving the bachelor's degree (prior to July 1, 1974), and having enrolled immediately in an accredited, professional, postgraduate school may apply for a bachelor's degree from Clemson and have his/her application considered on an individual basis. The college(s) at Clemson considering the application are authorized to examine the student's entire record in both preprofessional and professional studies and exercise their own judgment concerning the three-year requirement for Preprofessional Studies.

SCHOOL OF BUSINESS AND LEADERSHIP

The School of Business and Leadership strives to be a preferred learning-centered organization, educating men and women as leaders in business and the military and expanding their knowledge in the business fields.

The programs of the School of Business and Leadership embrace three major areas: teaching, research and public service. The School is responsible for seven graduate degree programs, eight undergraduate degree programs, ROTC programs in Military Science and Aerospace Studies, as well as a series of professional development courses for business and industry. The undergraduate curricula are in Accounting, Economics, Financial Management, Graphic Communications, Industrial Management, Management, and Marketing. The degrees in Accounting, Economics, Financial Management, Industrial Management, Management and Marketing share a common curriculum the first two years, allowing the student maximum flexibility in choosing the appropriate major; these degrees are accredited by the American Assembly of Collegiate Schools of Business. The curricula prepare students for a variety of careers and furnish an education on which to build for a lifetime. They recognize the need for an understanding of the basic principles of science, appreciation for the nature of human interaction, and the comprehension of the economic, political and social environment. Flexibility for selection of courses and emphasis areas is made possible by secondary concentrations and minors.

Aerospace Studies (AFROTC)

Air Force ROTC provides students an opportunity to earn a commission while pursuing a college degree. The program includes courses in history, communication, management, and political science with ten academic hours credited toward most degrees. AFROTC is designed to meet the need for dedicated and professional leaders in the active duty Air Force. Additional information is available from the Department of Aerospace Studies.

Military Science (Army ROTC)

The requirements for a commission in the U.S. Army are established by U.S. law and the Department of the Army. The legal and regulatory requirements are available at the Military Science Department. In addition to the Military Science curricula, all candidates for commissioning must successfully complete three credits of military history as approved by the professor of military science. Further information may be obtained from the Military Science Department.

ACCOUNTING Bachelor of Science

The program leading to the Bachelor of Science degree in Accounting is designed to prepare students for careers as professional accountants. Students completing this program are well prepared to enter many accounting career fields such as public, corporate and government accounting. Students are also well prepared to continue their study at the graduate level. Moreover, this curriculum provides

excellent preparation for students interested in entry-level management positions or graduate study in business or law.

In addition to accounting and business courses, approximately one-half of the curriculum is devoted to English and public speaking, mathematics, natural and social sciences, and the humanities. Thus, students in the accounting program obtain a broad-based education that not only gives them accounting expertise but also contributes to their proficiency in analytical, communication and interpersonal skills. Along with the general business accreditation held by the School of Business Leadership, the degree programs offered by the School of Accountancy and Legal Studies are separately accredited by the American Assembly of Collegiate Schools of Business.

Students planning to become Certified Public Accountants should note that as of July 1, 1997, the requirements to sit for the CPA examination in South Carolina include 150 hours of collegiate education and completion of a bachelor's degree. Other states have, or will soon have, similar requirements. The faculty of the School of Accountancy and Legal Studies believes these requirements are best met with a bachelor's degree in accounting and completion of the Master of Professional Accountancy (MPAcc) degree program. The MPAcc program also enhances the preparation of students pursuing accounting careers in other areas of specialization such as internal auditing, managerial accounting, and taxation.

Admission to the MPAcc program is separate from admission to the undergraduate program. It is based on the student's undergraduate record and score on the Graduate Management Admissions Test (GMAT). For information on the MPAcc program, contact the School of Accountancy, 301 Sirrine Hall.

Freshman Year

First Semester

- 1 - C & I 101 Business Foundations
- 3 - ENGL 101 Composition I¹
- 3 - HIST 173 Western Civilization
- 3 - MTHSC 102 Intro. to Mathematical Analysis¹
- 3 - PHIL 102 Introduction to Logic
- 4 - Science Requirement²

17

Second Semester

- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II¹
- 3 - MTHSC 207 Multivariable Calculus¹
- 3 - PSYCH 201 Introduction to Psychology or
- 3 - SOC 211 Introduction to Sociology
- 4 - Science Requirement²

16

Sophomore Year

First Semester

- 3 - ACCT 201 Accounting Concepts I¹
- 3 - ECON 211 Principles of Microeconomics
- 3 - MTHSC 301 Statistical Theory and Meth. I¹
- 3 - SPCH 250 Public Speaking or
- 3 - SPCH 251 Business and Prof. Speaking
- 3 - International Requirement³
- 1 - Elective⁴

16

Second Semester

- 3 - ACCT 202 Accounting Concepts II¹
- 1 - ACCT 204 Accounting Procedures¹
- 3 - CP SC 220 Microcomputer Applications¹
- 3 - ECON 212 Principles of Macroeconomics
- 3 - International Requirement²
- 3 - Literature Requirement²
- 1 - Elective⁴

17

Junior Year**First Semester**

- 3 - ACCT 301 Intermediate Accounting I¹
- 3 - ACCT 322 Accounting Information Systems¹
- 3 - FIN 311 Financial Management I¹
- 3 - MGT 301 Principles of Management
- 3 - Writing Intensive Requirement⁶

15

Second Semester

- 3 - ACCT 302 Intermediate Accounting II¹
- 3 - ACCT 340 Internal Auditing Theory^{1,7} or
3 - ACCT 415 Auditing^{1,7}
- 3 - FIN 312 Financial Management II¹
- 3 - MA SC 312 Decision Models for Management
- 3 - MKT 301 Principles of Marketing

15

Senior Year**First Semester**

- 3 - ACCT 303 Cost Accounting¹
- 3 - LAW 312 Commercial Law¹
- 3 - PHIL 344 Business Ethics
- 3 - Fine Arts Requirement⁸
- 3 - Elective⁴

15

Second Semester

- 3 - ACCT 404 Individual Taxation⁷ or
3 - ACCT 406 Business Taxation⁷
- 3 - ACCT 410 Budgeting and Executive Control¹
- 3 - LAW 313 Commercial Law¹
- 3 - MGT 415 Business Strategy
- 5 - Elective⁴

17

128 Total Semester Hours

¹Failure to follow the semester and sequencing recommendations may jeopardize the student's ability to complete degree requirements within eight semesters.

²Two semester sequence in the same laboratory science (see General Education Requirements).

³Either complete a two-semester foreign language sequence (level to be determined through placement and advising) or complete six hours of coursework on the geography, history, literature, religion, arts, or political or cultural environment of a nation or region other than the United States. A list of approved courses is available through advising. If an eight-hour elementary language sequence is approved, then elective credits are used to satisfy the difference in hours.

⁴Elective credits may be taken in any combination of 1-, 2-, 3-, or 4-hour courses, but see footnote 3 above.

⁵Choose from sophomore literature courses (200 level only) or foreign language literature courses (300 level or above).

⁶See major advisor for General Education Requirements

⁷Students planning to pursue the Master of Professional Accountancy degree program should take ACCT 404 and 415.

⁸To be selected from one of the following courses: AA H 210, MUSIC 210, or THEA 210.

Notes:

1. MTHSC 101, 104 or 105 may not be counted in computing the minimum number of credits required for graduation with a BS in Accounting degree.
2. Students must earn a C in all prerequisite accounting courses before enrolling in the next level accounting course. Courses for which this rule applies are ACCT 201, 202, 204, 301, 303 and 340.
3. At least 50 percent of the total credits taken in accounting, economics, finance, law, management, management science, and marketing must be taken at Clemson University.

ECONOMICS

A bachelor's degree in Economics provides a thorough understanding of the economic system and prepares students for a wide range of careers. By combining general education courses, a minor or study area, and a strong major in economics, students can prepare for specialized graduate studies and careers in business and government.

The Department of Economics offers two undergraduate degree paths. The Bachelor of Arts degree is distinguished by its emphasis on language skills and humanities. A broad choice of minors is available for this program. The Bachelor of Science program emphasizes quantitative skills and preparation for careers in business, law or graduate study in economics. Both programs require 30 credits of coursework in economics which may be satisfied by completing ECON 211, 212 and 24 credits of coursework above the sophomore level or by completing either ECON 200 or 201 and 27 credits above the sophomore level. Bachelor of Arts majors must complete ECON 314 and 315. Bachelor of Science majors must complete ECON 405 in addition to 314 and 315.

Bachelor of Arts**Freshman Year****First Semester**

- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 101 Composition I
- 3 - MTHSC 102 Intro. to Mathematical Analysis¹
- 4 - Foreign Language Requirement²
- 4 - Science Requirement³

17

Second Semester

- 3 - ENGL 102 Composition II
- 3 - HIST 173 Western Civilization
- 3 - MTHSC 207 Multivariable Calculus¹
- 4 - Foreign Language Requirement²
- 4 - Science Requirement³

17

Sophomore Year**First Semester**

- 3 - ECON 211 Principles of Microeconomics
- 3 - MTHSC 301 Statistical Theory and Methods¹
- 3 - Foreign Language Requirement²
- 3 - Literature Requirement⁴
- 4 - Elective

16

Second Semester

- 3 - ECON 212 Principles of Macroeconomics
- 3 - Foreign Language Requirement²
- 3 - Literature Requirement⁴

3 - Social Science Requirement⁵

4 - Elective

16

Junior Year**First Semester**

- 3 - ECON 314 Intermediate Microeconomics
- 3 - SPCH 250 Public Speaking
- 3 - Major⁶
- 3 - Minor
- 3 - Writing Intensive Requirement⁵
- 1 - Elective

16

Second Semester

- 3 - ECON 315 Intermediate Macroeconomics
- 3 - Major⁶
- 6 - Minor
- 3 - Social Science Requirement⁵
- 1 - Elective

16

Senior Year**First Semester**

- 6 - Major
- 6 - Minor
- 3 - Elective

15

Second Semester

- 6 - Major
- 9 - Elective

15

128 Total Semester Hours

¹The sequence MTHSC 102, 207, and 301 may be replaced by MTHSC 106, 108, and 301.

²Two years of the same modern language are required.

³Two courses, totaling eight hours, in the same science are required.

⁴ENGL 202, 203, 206, 207, 208, 209.

⁵See major advisor for General Education Requirements.

⁶ECON 301, 302, 306 and 310 may not be used to satisfy requirements for a degree in Economics.

Note: Students seeking teaching certification will be required to complete more than 128 semester hours.

Minor Concentration

Any minor in liberal arts including the Cluster minor and any minor offered by any other department in the School of Business is acceptable as a minor for the Bachelor of Arts curriculum in Economics.

Students who wish to combine the curriculum in Economics with secondary school teaching should take the degree in Education with a teaching area in Economics. The courses will be those required for teaching certification as specified by the South Carolina Department of Education as well as those required for an Economics major. Requirements for a major in Education with a teaching area in Social Sciences are shown on page 92.

A minor in Economics is provided for other degree programs consisting of 15 credits above the sophomore level which must include ECON 314 and 315.

Bachelor of Science**Freshman Year****First Semester**

- 1 - C & I 101 Business Foundations
- 3 - ENGL 101 Composition I
- 3 - HIST 173 Western Civilization II
- 3 - MTHSC 102 Intro. to Mathematical Analysis¹
- 3 - PHIL 102 Introduction to Logic
- 4 - Science Requirement²

17

Second Semester

- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 3 - MTHSC 207 Multivariable Calculus¹
- 3 - PSYCH 201 Introduction to Psychology *or*
- 3 - SOC 201 Introduction to Sociology
- 4 - Science Requirement²

1 - Elective

17

Sophomore Year**First Semester**

- 3 - ACCT 201 Accounting Concepts I
- 3 - ECON 211 Principles of Microeconomics
- 3 - MTHSC 301 Statistical Theory and Methods¹
- 3 - SPCH 250 Public Speaking *or*
- 3 - SPCH 251 Business and Prof. Speaking
- 3 - International Requirement^{3,4}

1 - Elective

16

Second Semester

- 3 - ACCT 202 Accounting Concepts II
- 3 - ECON 212 Principles of Macroeconomics
- 3 - International Requirement^{3,4}
- 3 - Literature Requirement⁵
- 3 - Writing Intensive Requirement⁶

1 - Elective

16

Junior Year**First Semester**

- 3 - ECON 314 Intermediate Microeconomics
- 3 - FIN 306 Corporate Finance⁷
- 3 - Social Science Requirement⁶
- 3 - Study Area
- 4 - Elective

16

Second Semester

- 3 - ECON 315 Intermediate Macroeconomics
- 3 - ECON 405 Introduction to Econometrics
- 3 - Major^{8,9}
- 3 - Study Area
- 4 - Elective

16

Senior Year**First Semester**

- 6 - Major
- 6 - Study Area
- 3 - Elective

15

Second Semester

- 6 - Major
- 9 - Study Area
- 15

128 Total Semester Hours

STUDY AREAS

Students in the Bachelor of Science program must complete 21 credits from the courses listed below. The courses are grouped into subject areas, but there is no restriction placed on the courses students may take. However, students must select from the courses listed. Students interested in careers in business should select primarily from the Business group; those who plan to attend law school should select primarily from the Pre-law group; students who plan to attend graduate school in Economics should take as many courses as possible from the Mathematical and Management Sciences group.

Business

- 3 - ACCT 301 Intermediate Accounting I
- 3 - ACCT 302 Intermediate Accounting II
- 3 - ACCT 303 Cost Accounting
- 3 - ACCT 404 Individual Taxation
- 3 - ACCT 405 Corporate Taxation
- 3 - ACCT 406 Business Taxation
- 3 - FIN 312 Financial Management II
- 3 - FIN 402 Asset Management
- 3 - FIN 404 Mgt. of the Corporate Capital Struct.
- 3 - FIN 405 Portfolio Management and Theory
- 3 - FIN 406 Stock Options and Futures Markets
- 3 - MGT 390 Operations Management
- 3 - MGT 402 Operations Planning and Control
- 3 - MGT 404 Advanced Statistical Quality Control
- 3 - MGT 415 Business Strategy
- 3 - MGT 418 Management Information Systems
- 3 - MKT 302 Consumer Behavior
- 3 - MKT 426 Business-to-Business Marketing
- 3 - MKT 430 Marketing Product Management

Mathematical and Management Sciences

- 2 - CP SC 157 Introduction to C Programming
- 3 - ECON 430 Advanced Economic Theory⁹
- 3 - MA SC 413 Management Science I
- 3 - MA SC 414 Statistical Analysis
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - MTHSC 311 Linear Algebra
- 3 - MTHSC 400 Theory of Probability
- 3 - MTHSC 403 Introduction to Statistical Theory
- 3 - MTHSC 453 Advanced Calculus I
- 3 - MTHSC 454 Advanced Calculus II
- 3 - MTHSC 463 Mathematical Analysis I
- 3 - MTHSC 464 Mathematical Analysis II

Pre-law

- 3 - HIST 325 American Economic Development
- 3 - LAW 312 Commercial Law *or*
- 3 - LAW 322 Legal Environment of Business
- 3 - LAW 401 Labor Law
- 3 - LAW 402 Law and Economics
- 3 - PO SC 432 American Constitutional Law I
- 3 - PO SC 433 American Constitutional Law II
- 3 - PO SC 434 Law, Courts, and Politics
- 3 - PO SC 453 American Political Thought

¹The sequence of MTHSC 102, 207, and 301 may be replaced by MTHSC 106, 108, and 301.

²Two courses totaling eight credits in the same science are required.

³Either complete a two-semester modern foreign language sequence (level to be determined through advising) or com-

plete six hours of course work relating to the culture, geography, history, literature, politics, or economics of a nation other than the United States. An approved list of courses is available through advising.

⁴Economics majors who take an economics course on the approved list for the International Requirement cannot also count the course for major credit.

⁵ENGL 202, 203, 204, 205, 206, 207, 208, 209.

⁶See major advisor for General Education Requirements.

⁷Students who plan to take Study Area courses in finance may take FIN 311 in lieu of 306.

⁸ECON 301, 302, 306, and 310 may not be used to satisfy requirements for a degree in Economics.

⁹If selected as a Study Area course, ECON 430 may not be used to satisfy requirements for a degree in Economics.

Note: At least 50 percent of the total credits taken in accounting, economics, finance, law, management and marketing must be taken at Clemson University.

FINANCIAL MANAGEMENT**Bachelor of Science**

The Bachelor of Science in Financial Management is designed to develop an understanding of financial markets in the contemporary economy, the operation of financial institutions and the financial management of business operations. The curriculum prepares the student for a career in such areas as banking, corporate financial management, financial services, insurance and real estate. Governments at all levels also employ finance graduates in many of their divisions. The curriculum also provides excellent preparation for students interested in graduate business education or attending law school.

The core of the curriculum emphasizes technical and communication skills. The student then has the flexibility to tailor courses to his/her own needs by choosing study areas in corporate finance, financial institutions, investments, real estate, accounting, or international finance.

Freshman Year**First Semester**

- 1 - C & I 101 Business Foundations
- 3 - ENGL 101 Composition I
- 3 - HIST 173 Western Civilization
- 3 - MTHSC 102 Intro. to Mathematical Analysis¹
- 3 - PHIL 102 Introduction to Logic
- 4 - Science Requirement²

17

Second Semester

- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 3 - MTHSC 207 Multivariable Calculus¹
- 3 - PSYCH 201 Introduction to Psychology *or*
- 3 - SOC 201 Introduction to Sociology
- 4 - Science Requirement²

16

Sophomore Year**First Semester**

- 3 - ACCT 201 Accounting Concepts I
- 3 - ECON 211 Principles of Microeconomics
- 3 - MTHSC 301 Statistical Theory and Methods I
- 3 - SPCH 250 Public Speaking *or*
- 3 - SPCH 251 Business and Prof. Speaking
- 3 - International Requirement¹

1 - Elective

16

Second Semester

- 3 - ACCT 202 Accounting Concepts II
- 1 - ACCT 204 Accounting Procedures
- 3 - ECON 212 Principles of Macroeconomics
- 3 - MA SC 310 Intro. to Management Science
- 3 - International Requirement³
- 3 - Literature Requirement⁴

16

Junior Year**First Semester**

- 3 - ACCT 301 Intermediate Accounting I
- 3 - FIN 307 Principles of Real Estate
- 3 - FIN 311 Financial Management I
- 3 - MGT 301 Principles of Management
- 3 - Writing Intensive Requirement²

15

Second Semester

- 3 - ACCT 302 Intermediate Accounting II
- 3 - FIN 305 Investment Analysis
- 3 - FIN 308 Financial Institutions and Markets
- 3 - FIN 312 Financial Management II
- 3 - LAW 312 Commercial Law
- 3 - Elective

18

Senior Year**First Semester**

- 3 - MKT 301 Principles of Marketing
- 3 - PHIL 344 Business Ethics
- 6 - Study Area⁵
- 3 - Elective

15

Second Semester

- 3 - MGT 415 Business Strategy
- 9 - Study Area⁵
- 3 - Elective

15

128 Total Semester Hours

¹Credits earned in MTHSC 106 and 108 may be substituted for MTHSC 102 and 207, respectively, and one or two elective hours.

²See major advisor for General Education Requirements.

³Either complete a two semester modern foreign language sequence (level to be determined through placement and advising) or complete six hours of course work on the culture, geography, history, literature, or political environment of a nation or region other than the United States. A list of approved courses is available through advising. If an eight-hour elementary modern foreign language sequence is chosen, two elective hours are used to accommodate the difference in credit hours. Students choosing to continue study of a language begun in high school should complete those courses during the freshman year and complete the Laboratory Science Requirement during the sophomore year.

⁴ENGL 202, 203, 204, 205, 206, 207, 208, 209, or 300-level foreign language literature.

⁵Twelve semester hours from one of the following Study Areas along with its corresponding courses. A study area should be selected by the end of the second semester of the junior year in consultation with Finance Department advisor.

Accounting—FIN 402, 404, and three accounting electives. (See note 4.)

Corporate Finance—FIN 402, 404, 411, two courses from FIN 405, 406, 408 and ACCT 406.

Financial Institutions—FIN 405, 406, 408, 411, FIN 304 or 417.

International Finance—FIN 406, 411, MGT 423 or MKT 427, and two courses in a foreign language in addition to the international requirements courses.

Investments—ACCT 404, FIN 405, 406, 411, FIN 304 or 417 or MKT 428.

Real Estate—AP EC 313, FIN 304 or 411, FIN 417, LAW 333, AP EC 413 or LAW 405.

Notes:

1. Financial Management majors are required to have a grade-point ratio of at least 2.0 in all FIN-designated courses in order to graduate. Only the last grade for courses that are repeated counts for computing the grade-point ratio.
2. MTHSC 101 may not be used as elective credit toward requirements for graduation with a BS in Financial Management.
3. At least 50 percent of the total credits taken in ACCT, ECON, LAW, MGT and MKT must be taken at Clemson.
4. Accounting electives may be selected from any 300 or 400-level course offered by the School of Accountancy. Credit may not be received for both ACCT 303 and 307.

GRAPHIC COMMUNICATIONS

Bachelor of Science

The Bachelor of Science degree in Graphic Communications is designed to prepare students for professional careers in printing, publishing, packaging, and related industries. The core curriculum assures the graduate of having the skills and knowledge required by most entry-level jobs. The major requirements allow each student to select courses which enhance career preparation in specific segments of graphic communications. Coursework is heavily oriented around individual laboratory performance which stresses the development of problem-solving skills in a broad cross section of manufacturing areas. Applications include all major processes and a variety of industry segments, including commercial printing, publishing, package production, specialty printing, and industrial applications of printing technology beyond communications. The most common career opportunities are in printing management, production planning and supervision, and commercial and technical sales.

Freshman Year**First Semester**

- 3 - ENGL 101 Composition I
- 1 - G C 101 Orientation to Graphic Comm.
- 3 - PSYCH 201 Introduction to Psychology
- 3 - THRD 180 Intro. to Computer-Aided Drafting
- 4 - Approved Laboratory Science Requirement¹
- 3 - Mathematics Requirement²

17

Second Semester

- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 3 - EX ST 301 Introductory Statistics or
- 3 - MTHSC 203 Elem. Statistical Inference or
- 3 - MTHSC 301 Stat. Theory and Methods I
- 4 - G C 104 Graphic Communications I
- 4 - Approved Laboratory Science Requirement¹

17

Sophomore Year**First Semester**

- 3 - ACCT 203 Financial Accounting³
- 3 - G C 207 Graphic Communications II
- 3 - G C 215 Photo. and Digital Imaging Tech.
- 3 - MGT 301 Principles of Management
- 4 - Approved Laboratory Science Requirement¹

16

Second Semester

- 3 - ACCT 307 Managerial Accounting
- 3 - ECON 200 Economic Concepts or
- 3 - ECON 201 Principles of Economics or
- 3 - ECON 211 Principles of Microeconomics
- 3 - G C 310 Alternative Approaches to Imaging
- 3 - MGT 399 Mgt. Appl. of Microcomputers
- 3 - SPCH 250 Public Speaking or
- 3 - SPCH 251 Business and Prof. Speaking
- 3 - THRD 224 Machine Tool Processes

18

1 - G C 350 Internship I⁴**Junior Year****First Semester**

- 3 - EN SP 200 Intro. to Environmental Science
- 4 - G C 406 Problems in Specialty Printing
- 3 - MGT 307 Personnel Management or
- 3 - PSYCH 364 Industrial Psychology
- 3 - THRD 250 Electricity
- 3 - Literature Requirement³

16

Second Semester

- 3 - ENGL 314 Technical Writing
- 5 - G C 440 Advanced Lithographic Methods
- 3 - MKT 301 Principles of Marketing
- 3 - PHIL 344 Business Ethics
- 3 - Major Requirement⁶

17

1 - G C 450 Internship II⁴**Senior Year****First Semester**

- 4 - G C 444 Current Dev. and Trends in G.C.
- 3 - THRD 360 Ind. Organizations and Safety
- 6 - Major Requirement⁶
- 3 - Elective

16

Second Semester

- 3 - G C 448 Plan. and Cont. Printing Functions
- 2 - G C 480 Senior Seminar in Graphic Comm.
- 4 - Major Requirement⁶
- 7 - Elective

16

135 Total Semester Hours

¹Approved Laboratory Science Requirement must include a two-semester sequence from chemistry or physics.

²See major advisor for General Education Requirements.

³ACCT 201 and 202 may be taken in lieu of 203.

⁴Student is required to complete at least two work periods. At least one must be in a fall or spring semester (summer at least 12 weeks; fall/spring 15 week minimum).

⁵ENGL 202, 203, 204, 205, 206, 207, 208, or 209.

⁶Major Requirements must be approved by Graphic Communications faculty advisor prior to registration. A list of acceptable Major Requirements is available in the Graphic Communications Office.

INDUSTRIAL MANAGEMENT

Bachelor of Science

The Bachelor of Science degree in Industrial Management is designed to prepare students for management challenges in manufacturing, production planning, inventory control, quality assurance, and

service operations. Students receive a broad-based education in business, but particular emphasis is placed on systems, theories, and issues dealing with the production of goods and services. The program is particularly relevant in today's economic environment, where improvements in productivity and quality are essential to meet the growing challenges of foreign producers. In addition to jobs in manufacturing management, graduates in Industrial Management are sometimes sought for positions as project directors by government agencies and research centers. Financial institutions have found the industrial management graduate well prepared for internal operations management as well as for liaison positions dealing with manufacturing companies as bank customers. The Industrial Management program is accredited by the American Assembly of Collegiate Schools of Business and has received a special commendation for excellence from the South Carolina Commission on Higher Education.

Students who have attended Clemson at least one semester may change majors to Industrial Management with at least a 2.2 cumulative grade-point ratio. Exceptions must be approved by the department chair.

Freshman Year

First Semester

- 1 - C & I 101 Business Foundations¹
- 3 - ENGL 101 Composition I
- 3 - HIST 173 Western Civilization¹
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 3 - PHIL 102 Introduction to Logic¹
- 4 - Science Requirement²

17

Second Semester

- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 3 - MTHSC 207 Multivariable Calculus
- 3 - PSYCH 201 Introduction to Psychology¹ or
- 3 - SOC 201 Introduction to Sociology¹
- 4 - Science Requirement²

16

Sophomore Year

First Semester

- 3 - ACCT 201 Accounting Concepts I
- 3 - ECON 211 Principles of Microeconomics
- 3 - MTHSC 301 Statistical Theory and Methods I
- 3 - SPCH 250 Public Speaking¹
- 3 - International Studies Requirement¹
- 1 - Elective

16

Second Semester

- 3 - ACCT 202 Accounting Concepts II
- 3 - ECON 212 Principles of Macroeconomics
- 3 - MA SC 310 Intro. to Management Science⁴
- 1 - MGT 299 Computer Utilization⁴
- 3 - International Studies Requirement¹
- 3 - Literature Requirement^{1,3}

1 - Elective

17

Junior Year

First Semester

- 3 - ACCT 307 Managerial Accounting
- 3 - MGT 399 Mgt. Appl. of Microcomputers⁴

- 3 - MKT 301 Principles of Marketing
- 3 - PHIL 344 Business Ethics
- 3 - Writing Intensive Requirement⁶
- 3 - Elective

18

Second Semester

- 3 - FIN 306 Corporation Finance
- 3 - LAW 322 Legal Environment of Business
- 3 - MGT 312 Decision Models for Management⁴
- 3 - MGT 305 Economics of Transportation¹ or
- 3 - MGT 317 Logistics Management⁴
- 3 - MGT 307 Personnel Management⁴
- 3 - MGT 390 Operations Management⁴

18

Senior Year

First Semester

- 3 - ECON (MGT) 306 Managerial Economics
- 3 - MA SC 414 Statistical Analysis⁴
- 3 - MGT 400 Mgt. of Organizational Behavior⁴
- 3 - MGT 402 Operations Planning and Control⁴
- 3 - MGT 418 Management Information Systems⁴
- 1 - Elective

16

Second Semester

- 3 - MGT 404 Adv. Statistical Quality Control⁴
- 3 - MGT 408 Design of Production Systems⁴
- 3 - MGT 415 Business Strategy⁴
- 3 - MGT 423 International Business Management⁴
- 4 - Elective

16

134 Total Semester Hours

¹May be taken during either first or second semester of designated year.

²A two-semester sequence in the same physical or biological science, each including a laboratory.

³Either complete a two-semester foreign language sequence (level to be determined through advising) or complete six hours of course work on the geography, history, literature, religion, arts, or political or cultural environment of a nation or region other than the United States. A list of approved courses is available through advising. If an eight-hour elementary language sequence is approved, then six hours will be credited to the international requirement and two hours will be credited to free electives. Students who take two 3-hour courses for the international requirement should schedule two hours of free electives as part of their core program.

⁴Industrial Management majors need a grade of C or higher in this course for graduation.

⁵Choose from sophomore literature courses (200-level only) or foreign language literature courses (300-level or higher).

⁶See major advisor for General Education Requirements.

Note: At least 50 percent of the total credits taken in ACCT, FIN, LAW, MGT, and MKT must be taken at Clemson.

MANAGEMENT

Bachelor of Science

The Bachelor of Science degree in Management is designed to prepare students for careers as professional managers in corporations, governmental organizations, and small businesses. In addition, the program provides a foundation for graduates who wish to pursue advanced degrees in business and public administration, law, and the social sciences.

The curriculum gives the student a broad exposure to the functional areas of business and allows each to select an area of emphasis in a subject that is

germane to individual career interests. The Management curriculum provides (1) an examination of the social, legal, political, and economic environments in which organizations must operate; (2) an understanding of the functional areas of business and their interrelationships; and (3) a knowledge of behavioral science, applied statistics, and mathematics as they relate to organizational problem solving. The program is accredited by the American Assembly of Collegiate Schools of Business.

Students who have attended Clemson at least one semester may change majors to Management with at least a 2.2 cumulative grade-point ratio. Exceptions must be approved by the department chair.

Freshman Year

First Semester

- 1 - C & I 101 Business Foundations¹
- 3 - ENGL 101 Composition I
- 3 - HIST 173 Western Civilization¹
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 3 - PHIL 102 Introduction to Logic¹
- 4 - Science Requirement²

17

Second Semester

- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 3 - MTHSC 207 Multivariable Calculus
- 3 - PSYCH 201 Introduction to Psychology¹ or
- 3 - SOC 201 Introduction to Sociology¹
- 4 - Science Requirement²

16

Sophomore Year

First Semester

- 3 - ACCT 201 Accounting Concepts I
- 3 - ECON 211 Principles of Microeconomics
- 3 - MTHSC 301 Statistical Theory and Methods I
- 3 - SPCH 250 Public Speaking¹
- 3 - International Studies Requirement¹
- 1 - Elective

16

Second Semester

- 3 - ACCT 202 Accounting Concepts II
- 3 - ECON 212 Principles of Macroeconomics
- 3 - MA SC 310 Intro. to Management Science⁴
- 1 - MGT 299 Computer Utilization⁴
- 3 - International Studies Requirement¹
- 3 - Literature Requirement^{1,3}

1 - Elective

17

Junior Year

First Semester

- 3 - ACCT 307 Managerial Accounting
- 3 - MA SC 312 Decision Models for Management⁴
- 3 - MGT 399 Mgt. Appl. of Microcomputers⁴
- 3 - MKT 301 Principles of Marketing
- 3 - PHIL 344 Business Ethics
- 3 - Elective

18

Second Semester

- 3 - FIN 306 Corporation Finance
- 3 - LAW 322 Legal Environment of Business
- 3 - MGT 307 Personnel Management⁴

- 3 - Economics Requirement⁶
- 3 - Writing Intensive Requirement⁷
- 3 - Elective

18

Senior Year

First Semester

- 3 - MGT 390 Operations Management⁴
- 3 - MGT 400 Mgt. of Organizational Behavior⁴
- 3 - MGT 418 Management Information Systems⁴
- 6 - Study Area^{4,8}
- 2 - Elective

17

Second Semester

- 3 - MGT 415 Business Strategy⁴
- 3 - MGT 423 International Business Mgt.⁴
- 3 - Operations Management Requirement^{4,9}
- 6 - Study Area^{4,8}

15

134 Total Semester Hours

¹May be taken during either first or second semester of designated year.

²A two-semester sequence in the same physical or biological science including a laboratory.

³Either complete a two-semester foreign language sequence (level to be determined through advising) or complete six hours of course work on the geography, history, literature, religion, arts, or political or cultural environment of a nation or region other than the United States. A list of approved courses is available through advising. If an eight-hour elementary language sequence is approved, then six hours will be credited to the international requirement and two hours will be credited to free electives. Students who take two 3-hour courses for the international requirement should schedule two hours of free electives as part of their core program.

⁴Management majors need a grade of C or higher in this course for graduation.

⁵Choose from Sophomore literature courses (200-level only) or foreign language literature courses (300-level or higher).

⁶Select from ECON 301, 308, 309, 314.

⁷See major advisor for General Education Requirements.

⁸Twelve semester hours beyond required courses in any one of the following three tracks. Students should select their study area as soon as possible.

Human Resources Management—MGT 416, 425, ECON 401, plus either MGT 431, 430, or LAW 401.

International Management—MGT 424, FIN 411, LAW 420, plus either ECON 412, PO SC 373, or L&IT 401 or MKT 427.

Transportation and Logistics—MGT 305, 317, 424, plus either MGT 426, 430, or 490.

⁹Select from MGT 402, 404, 408.

Note: At least 50 percent of the total credits taken in accounting, finance, law, management, and marketing must be taken at Clemson University.

MARKETING

Bachelor of Science

The Bachelor of Science degree program in Marketing is designed to provide students with knowledge of the various aspects of marketing. The curriculum prepares students for professional marketing careers in industry, government, or the nonprofit sector. The graduate should also be well prepared for entrance into the Master of Business Administration, Law, or other graduate programs. For students who want a general perspective of marketing, the curriculum provides a broad range of subjects including sales management, retailing, promo-

tional strategy, marketing research, marketing management, and international marketing. Study areas in technical marketing and services marketing are available to students who seek to specialize. The Marketing curriculum, whether approached from a general or specialized perspective, provides the conceptual, quantitative, and analytical skills necessary for students to function in a dynamic business environment. The Bachelor of Science degree program in Marketing is accredited by the American Assembly of Collegiate Schools of Business.

Freshman Year

First Semester

- 1 - C & 1 101 Business Foundations¹
- 3 - ENGL 101 Composition I
- 3 - HIST 173 Western Civilization¹
- 3 - MTHSC 102 Intro. to Mathematical Analysis²
- 3 - PHIL 102 Introduction to Logic¹
- 4 - Science Requirement³

17

Second Semester

- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 3 - MTHSC 207 Multivariable Calculus²
- 3 - PSYCH 201 Introduction to Psychology¹ or 3 - SOC 201 Introduction to Sociology¹
- 4 - Science Requirement³

16

Sophomore Year

First Semester

- 3 - ACCT 201 Accounting Concepts I
- 3 - ECON 211 Principles of Microeconomics
- 3 - MTHSC 301 Statistical Theory and Methods I
- 3 - SPCH 250 Public Speaking¹ or 3 - SPCH 251 Business and Prof. Speaking¹
- 3 - International Studies Requirement⁴

- 1 - Elective

16

Second Semester

- 3 - ACCT 202 Accounting Concepts II
- 3 - ECON 212 Principles of Macroeconomics
- 3 - MA SC 310 Intro. to Management Science
- 3 - International Studies Requirement⁴
- 3 - Literature Requirement^{1,3}

- 1 - Elective

16

Junior Year

First Semester

- 3 - MGT 301 Principles of Management
- 3 - MKT 301 Principles of Marketing
- 3 - LAW 312 Commercial Law or 3 - LAW 322 Legal Environment of Business
- 6 - Study Area Requirement⁶
- 3 - Writing Intensive Requirement⁷

18

Second Semester

- 3 - FIN 306 Corporate Finance
- 3 - MKT 302 Consumer Behavior
- 3 - MKT 431 Marketing Research
- 3 - PHIL 344 Business Ethics
- 3 - Study Area Requirement⁶

15

Senior Year

First Semester

- 3 - MGT 415 Business Strategy
- 3 - MKT 427 International Marketing
- 6 - Study Area Requirement⁶
- 4 - Elective

16

Second Semester

- 3 - MKT 450 Strategic Marketing Management
- 9 - Study Area Requirement⁶
- 4 - Elective

16

130 Total Semester Hours

¹Course may be taken during either first or second semester of designated year.

²Credit earned in MTHSC 106 and 108 may be substituted for MTHSC 102 and 207 respectively, and one or two elective hours.

³A two-semester sequence in the same physical or biological science, including laboratory.

⁴Either complete a two-semester modern foreign language sequence (level to be determined through advising) or complete six hours of course work on the culture, geography, history, literature, or political environment of a nation or region other than the United States. A list of approved courses is available through advising. If an eight-hour elementary modern foreign language sequence is chosen, two elective hours are used to accommodate the difference in credit hours. Students choosing to continue study of a language begun in high school should complete those courses during the freshman year and complete the Laboratory Science Requirement during the sophomore year.

⁵ENGL 202, 203, 204, 205, 206, 207, 208, 209, or foreign language literature courses (300 level or higher).

⁶Select from one of the study areas listed below. See advisor for list of approved courses for the additional hours requirement in each study area.

General Marketing Study Area—MKT 420 or 423; MKT 426 or 428 or 429; any one additional MKT course; and an additional 15 hours of approved courses. Options available are Business-to-Business, Communications, General, Pre-Law, Pre-MBA, and Public Sector.

Services Marketing Study Area—MKT 420 or 423; 426 or 429; 428; and an additional 15 hours of approved courses. Options available are Banking, Entrepreneurship, Food Services, Health/Hospital Administration, Real Estate, Recreation, Sports, Tourism, and other service-related areas subject to approval by Services Marketing Study Area Advisor.

Technical Marketing Study Area—MKT 420 and 426 and 438; MKT 424 or 430; and an additional 12 hours of approved courses. Options available are Biology, Chemistry, Computer Science, Engineering, Environmental Science, Food Science, Graphic Communications, Logistics, Packaging Science, Textile Chemistry, Textile Science, and other technical areas subject to approval by Technical Marketing Study Area Advisor.

⁷Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)

Notes:

1. Marketing majors are required to have a grade-point ratio of at least 2.0 in all MKT-designated courses in order to graduate. Only the last grade for courses that are repeated counts in computing this grade-point ratio.

2. Students majoring in Marketing are not permitted to use MTHSC 101, 104, and 105 as credit toward the number of credits needed for graduation.

3. At least 50 percent of the total credit hours taken in accounting, finance, law, management, and marketing must be taken at Clemson University.

SCHOOL OF SOCIAL SCIENCES

Bachelor of Arts degrees in social sciences are offered in Political Science, Psychology and Sociology. The curricula are designed to meet the needs of students desiring a broad general education, with emphasis on the humanities, as preparation for intelligent citizenship, general commercial and industrial life, government service, and teaching. These curricula also provide an excellent background for the study of law, journalism and medicine.

To achieve depth as well as breadth in his/her educational experience, a student selects a major concentration consisting of at least 24 semester hours from courses above the sophomore level. A student also chooses a minor concentration consisting of at least 15 additional semester hours. Courses satisfying the student's major concentration may not also be included in the minor. Refer to the chart on page 30 for acceptable minors.

The total number of semester credits required for the degree is 130. Of these, at least 12 credits must be earned in humanities courses numbered 300 or higher (A A H 210, MUSIC 210 and THEA 210 excepted). The humanities are for this purpose considered to include art and architectural history, English (except 304, 312, 314, 316, 331, 333, 334, 335, 485, 490, 495), languages, music, philosophy, religion, speech (except 362 and 364), theatre (except 377, 387, and 397), and women's studies, as well as courses entitled Humanities.

Students in the BA program who expect to teach in the public schools may elect education courses required for teaching certificates by the South Carolina State Department of Education. Such courses are to be approved by their own department advisors.

Courses Not Approved for Graduation Credit

Students majoring in Political Science, Psychology and Sociology are not permitted to use ENGL 100, MTHSC 115, 116, 215, 216 as credit toward the number of credits needed for graduation.

POLITICAL SCIENCE

Bachelor of Arts

The requirements for a major in Political Science consist of the required PO SC 101, 102, 341; plus at least 21 additional semester hours of political science at the 300 or 400 level, including at least one course from four of the following five fields:

- American Government—PO SC 403, 405, 432, 442
- Comparative Politics—PO SC 371, 373, 471, 475, 476, 477
- International Relations—PO SC 361, 428, 462, 463, 465
- Political Theory—PO SC 351, 352, 453
- Public Policy and Public Administration—PO SC 302, 321.

The student's elective hours in political science are chosen with the consent and advice of the departmental advisor to ensure an appropriate balance of breadth and specialization within the field of political science. In addition to the courses listed above,

the department offers a wide range of specialized courses in each of the subfields of the political science discipline, including the following:

- American Government—PO SC 404, 408, 409, 433, 434, 435, 443, 448, 454.
- Comparative Politics—PO SC 472.
- International Relations—PO SC 375, 379, 468, 476.
- Public Policy and Public Administration—PO SC 381, 407, 423, 426, 427.
- Other Courses—PO SC 310, 311, 312, 458.

Note: No more than six hours credit from PO SC 310, 311, and 312 may be counted toward any degree; no more than three hours credit from these courses may be applied to the requirements of a Political Science major.

Freshman Year

First Semester

- 3 - ENGL 101 Composition I
- 3 - MTHSC 101 Introduction to Probability¹
- 3 - PO SC 101 Introduction to American Politics
- 4 - Foreign Language Requirement²
- 4 - Science Requirement³

17

Second Semester

- 3 - ENGL 102 Composition II
- 3 - MTHSC 102 Intro. to Mathematical Analysis¹
- 3 - PO SC 102 Introduction to Global Issues
- 4 - Foreign Language Requirement²
- 4 - Science Requirement³

17

Sophomore Year

First Semester

- 3 - HIST 172 Western Civilization
- 3 - Computer Skills Requirement¹
- 3 - Foreign Language Requirement²
- 3 - Literature Requirement⁴
- 3 - Major and Minor Areas⁵
- 3 - Oral Communication Requirement³

18

Second Semester

- 3 - HIST 173 Western Civilization
- 3 - Foreign Language Requirement²
- 3 - Literature Requirement⁴
- 6 - Major and Minor Areas⁵
- 3 - Writing Intensive Requirement³

18

Junior Year

First Semester

- 3 - PO SC 341 Political Sci. Research Methods
- 3 - Advanced Humanities Requirement⁶
- 6 - Major and Minor Areas⁵
- 3 - Elective

15

Second Semester

- 3 - Advanced Humanities Requirement⁶
- 9 - Major and Minor Areas⁵
- 3 - Elective

15

Senior Year

First Semester

- 3 - Advanced Humanities Requirement⁶

- 6 - Major and Minor Areas⁵

- 6 - Elective

15

Second Semester

- 3 - Advanced Humanities Requirement⁶

- 6 - Major and Minor Areas⁵

- 6 - Elective

15

130 Total Semester Hours

¹Students may pursue alternate sequences consistent with the General Education Requirement. Examples include MTHSC 101 and 106 or 203; 102 and 207; or 106 and 108, 207, 301.

²The equivalent of two years in the same foreign language is required. Completion of the 202 course fulfills this requirement.

³See General Education Requirements.

⁴ENGL 202, H202, 203, H203, 204, H204, 205, H205, 206, H206, 207, H207, 208, H208, 209, H209 and H210.

⁵See the list of approved minors for political science on pages 30-31.

⁶Advanced humanities are courses numbered 300 or higher (AAH 210, MUSIC 210, THEA 210 excepted). The humanities for this purpose include art and architectural history, English (except 304, 312, 316, 331, 333, 334, 335, 485, 490, 495), languages, music, philosophy, religion, speech (except 362 and 364), theatre (except 377, 387, and 397), and women's studies, as well as courses entitled Humanities.

PSYCHOLOGY

Bachelor of Arts

Psychology is the study of human and animal behavior and the biological, psychological and social processes related to that behavior. The Bachelor of Arts degree in Psychology is designed to prepare students for a variety of professional careers related to human resources, personnel, counseling and other people-oriented positions in human services, business and industry. Additionally, the Bachelor of Arts degree provides excellent preparation for graduate training in such areas as clinical, counseling, industrial, experimental, cognitive, social, biological, health, developmental, and school psychology. The program also provides excellent preparation for students who intend to pursue professional training in medicine, physical or occupational therapy, dentistry, pharmacy, veterinary science, or law.

The major in Psychology consists of the required courses PSYCH 201, 210, 310, 324, 333, 352, at least one laboratory course (PSYCH 321, 325, 334, 423), plus 15 additional credits in psychology at the 300- or 400-level. These 15 credits must include a minimum of six credits at the 400 level, at least three of which must be from courses numbered between 400 and 489. BIOSC 470 may be taken in lieu of one 300- or 400-level elective psychology course.

Students should consult their academic advisors for other degree requirements and course recommendations.

Freshman Year

First Semester

- 3 - ENGL 101 Composition I
- 3 - PSYCH 201 Introduction to Psychology
- 4 - Foreign Language Requirement¹
- 3 - Mathematical Sciences Requirement²
- 4 - Science Requirement³

17

Second Semester

- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 4 - Foreign Language Requirement¹
- 3 - Mathematical Sciences Requirement²
- 4 - Science Requirement³

17

Sophomore Year**First Semester**

- 4 - PSYCH 210 Introductory Experimental Psych.
- 3 - Cultural Awareness⁴
- 3 - Foreign Language Requirement¹
- 3 - Literature Requirement³
- 3 - Elective⁶

16

Second Semester

- 4 - PSYCH 310 Advanced Experimental Psych.
- 3 - Cultural Awareness⁴
- 3 - Humanities Requirement²
- 3 - Foreign Language Requirement¹
- 3 - Elective⁶

16

Junior Year**First Semester**

- 6 - Major Area
- 3 - Minor Area³
- 3 - Social Science Requirement (other than Psychology)
- 3 - Writing Intensive Requirement¹
- 1 - Elective⁶

16

Second Semester

- 3 - Humanities Requirement²
- 4 - Major Area
- 3 - Minor Area³
- 3 - Oral Communication Requirement¹
- 3 - Elective⁶

16

Senior Year**First Semester**

- 9 - Major Area
- 6 - Minor Area³

15

Second Semester

- 6 - Major Area
- 6 - Minor Area³
- 3 - Elective⁶

15

128 Total Semester Hours

¹The equivalent of two years (through 202) of the same modern language is required.

²Recommended sequences: MTHSC 101 and 203 or 102 and 207. Other approved sequences: MTHSC 106 and 108; 106 and 301; 106 and 207; or 102 and 106.

³See General Education Requirements.

⁴See department approved listing.

⁵ENGL 202, 203, 204, 205, 206, 207, 208, 209 or 300-level foreign language.

⁶All University courses except MTHSC 115, 116, 215, 216.

⁷Humanities courses numbered 300 or higher (A A H 210, MUSIC 210 and THEA 210 excepted). The humanities for this purpose include art and architectural history, English (except 304, 312, 314, 316, 331, 333, 334, 335, 485, 490, 495), languages, music, philosophy, religion, speech (except

362 and 364), theatre (except 377, 387, and 397), and women's studies, as well as courses entitled Humanities.

⁸Any minor which has been approved by the University and listed on pages 30-31.

SOCIOLOGY**Bachelor of Arts**

The Sociology major consists of the program specified below and 21 hours from one of the following concentrations:

General Sociology—One course from each of the following pairs: SOC 311 or 432, 330 or 331, 350 or 351; and 12 credits from among all courses offered in sociology or anthropology not already taken to fulfill requirements.

Social Services Sociology—SOC 380, SOC 484, and SOC (R S) 495, one course from among SOC 392, 394, 396, 397, 480, 481; and nine credits from among all courses offered in sociology and anthropology not already taken to fulfill requirements, including PSYCH 488.

Criminal Justice Sociology—SOC 390, either 392 or 393, one course from among SOC 391, 396, 397, HIST 496, PO SC 434, 435; and 12 credits from among all courses offered in sociology and anthropology not already taken to fulfill requirements. SOC (R S) 495 is recommended.

Community and Population Studies—Offered jointly with Rural Sociology: (A) twelve hours from among CR P 411, SOC (R S) 359, 371, 401, 471; (B) nine hours from among CR P 415, 472, 473; CR D 357, CR D (APEC) 411, 412, MTHSC 301, SOC 330, 331, 430, and the one three-hour course not used to satisfy requirement A above. (R S 301 may be substituted for SOC 201 by Community and Rural Development majors.)

At least nine of the total credits must be 400-level sociology and/or rural sociology course; no more than nine credit hours may be taken in courses at the 100- or 200-level, except with department chair's approval.

Substance Abuse Certificate Program

The Substance Abuse Certificate Program is an interdisciplinary program drawn from courses in sociology, education, health and psychology. Students study the causes, consequences, prevention and treatment of substance abuse as well as delivery systems and policy issues associated with legal and illicit substances. A field placement brings students face to face with the problem and provides practical experience to prepare them as practicing specialists. The program prepares students for state credentialing as substance abuse specialists. The credential requires knowledge in theory and treatment of substance abuse problems.

Completion of the Substance Abuse Certificate Program requires ED C 234, HLTH 301, SOC 380, 396, 397, 495, and PSYCH 499.

Freshman Year**First Semester**

- 3 - ENGL 101 Composition I
- 3 - MTHSC 101 Introduction to Probability¹
- 3 - SOC 201 Introduction to Sociology
- 4 - Foreign Language Requirement²
- 4 - Science Requirement³

17

Second Semester

- 3 - ENGL 102 Composition II
- 3 - HIST 172 Western Civilization
- 3 - MTHSC 203 Elementary Statistical Inference¹
- 4 - Foreign Language Requirement²
- 4 - Science Requirement³

17

Sophomore Year**First Semester**

- 3 - CP SC 120 Issues in Computers
- 3 - HIST 173 Western Civilization
- 3 - Foreign Language Requirement²
- 3 - Humanities Requirement (E.1)³
- 3 - Oral Communication Requirement¹
- 3 - Elective

18

Second Semester

- 4 - SOC 303 Methods of Social Research
- 3 - Advanced Humanities Requirement⁴
- 3 - Foreign Language Requirement²
- 3 - Humanities Requirement (E.2)³
- 3 - Writing Intensive Requirement¹

16

Junior Year**First Semester**

- 3 - Advanced Humanities Requirement⁴
- 6 - Minor³
- 3 - Sociology Concentration
- 5 - Elective

17

Second Semester

- 3 - Advanced Humanities Requirement⁴
- 6 - Minor³
- 6 - Sociology Concentration

15

Senior Year**First Semester**

- 3 - SOC 460 Race, Ethnicity, and Class or 3 - SOC 461 Sex Roles
- 3 - Advanced Humanities⁴
- 6 - Sociology Concentration
- 3 - Elective

15

Second Semester

- 3 - SOC 404 Sociological Theory
- 3 - Minor³
- 6 - Sociology Concentration
- 3 - Elective

15

130 Total Semester Hours

¹Sociology majors must take either MTHSC 101 and 203 or 106 and 301.

²The equivalent of two years (through 202) in the same foreign language is required.

³See General Education Requirements.

⁴Advanced humanities are courses numbered 300 or higher (A A H 210, MUSIC 210, THEA 210 excepted). The humanities for this purpose include art and architectural history, English (except 304, 312, 314, 316, 331, 333, 334, 335, 485, 490, 495), languages, music, philosophy, religion, speech (except 362 and 364), theatre (except 377, 387, 397), and women's studies, as well as courses entitled Humanities.

⁵Any minor that has been approved by the University

COLLEGE OF ENGINEERING AND SCIENCE

The College of Engineering and Science offers a broad range of rigorous and stimulating baccalaureate degree programs which provide the student with unexcelled educational opportunities. The innovative combination of engineering and science disciplines which comprise the College facilitates study and research in fields that transcend the traditional disciplines. Students enjoy close interaction with a distinguished and dedicated faculty which is committed to excellence in undergraduate education as well as in research.

The engineering, science and textiles curricula are described below in separate sections to simplify presentation of degree requirements.

ENGINEERING PROGRAMS

Clemson offers eight professional Bachelor of Science degree programs: Agricultural Engineering, Ceramic Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Industrial Engineering, and Mechanical Engineering. The curriculum in Agricultural Engineering is jointly administered with the College of Agriculture, Forestry and Life Sciences.

Each of the eight professional curricula is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, the recognized national accrediting agency for engineering curricula.

Each of the engineering programs leads to a wide range of career opportunities and serves as preparation for further study at the graduate level. The professional curricula do not offer specific options, although each curriculum does provide opportunity for specialization. Thus, for example, a civil engineering student is graduated in civil engineering rather than in structural engineering, highway engineering, sanitary engineering, or other such sub-disciplines. However, a student with special interest in one of these areas will find adequate courses within the Civil Engineering curriculum to prepare for work or advanced study in that area.

Minors

Students in engineering degree programs may select a minor area of study including some engineering minors. By careful selection of electives, engineering students may often complete a minor course of study within the semester hour requirements of the major degree program. Students should consult their advisors for additional details. (See page 30 for minors available.)

International Programs

Engineering is now practiced in a global environment, thus engineering students are strongly encouraged to include an international dimension in their education, including the study of a foreign language. International programs offered within the College include EPIC (the Engineering Program for Inter-

national Careers), GE³ (Global Engineering Summer Exchange Consortium), the Engineering/Science Summer Study Abroad Program, and the Clemson U.—Hiroshima U. Exchange Program. Additional opportunities are available through the University Study Abroad Office. Further information may be obtained in the Office of the Associate Dean for Undergraduate Studies (107 Riggs Hall).

Admission Requirements

The basic requirements for admission to the University are given on page 10. Engineering applicants are strongly advised to include the following in their high school program:

Mathematics—Four units, including Geometry, Trigonometry, and introductory Calculus.

Laboratory Science—At least three units, including both Chemistry and Physics.

Computing—At least one unit, including introduction to a programming language. Applicants should have good keyboarding skills.

General Engineering Program

All engineering students must complete a common curriculum for the freshman year before being admitted into one of the nine engineering baccalaureate degree programs. Thus, all new engineering students (including transfer students) are admitted into the General Engineering Program until all classes in this first-year curriculum are completed.

Freshman Curriculum

First Semester

- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 1 - ENGR 101 Introduction to Engineering
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Humanities/Social Science Requirement¹

15

Second Semester

- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 3 - ENGR 120 Engineering Problem Solving and Design
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I

17

¹History 122 is strongly recommended. See policy on Humanities and Social Science for Engineering Curricula for other acceptable courses.

Admission into Engineering Degree Programs

Students who wish to transfer into a degree granting engineering major must have completed the freshman curriculum of the General Engineering Program with a "C" or better in all specifically listed courses and have earned a 2.0 minimum cumulative grade point ratio in courses taken at Clemson. The change-of-major request is to be initiated by students prior to the registration period during the semester in which they expect to complete the General Engineering curriculum. Students who fail to meet the requirements for admission into a degree granting program may remain in the General Engineering Program until transfer eligibility is established; however, the only engineering courses in

which they can enroll are C E 201, CR E 210, E G 209, E M 201, 202 and ENGR 101 and 120. A student changing to an engineering degree granting program will follow the curriculum in effect at the time of the change.

Policy on Humanities and Social Sciences for Engineering Curricula

To ensure that engineers are aware of their responsibilities to society and are able to consider societal factors in the decision-making process, courses in the humanities and social sciences must be an integral part of their education. While many humanistic/social science courses may be of interest and value to the engineering student, the objectives of the profession require the concentration of some courses in one or two areas rather than a collection of unrelated, introductory courses.

To meet these professional objectives, a student must accumulate a minimum of 16 credit hours in the humanities and social sciences. These credits must satisfy the following criteria:

1. Either
 - a) Nine credit hours in a given subject area or
 - b) Six credit hours in each of two different subject areas.
2. A minimum of six credit hours in humanities, which must include the following:
 - a) Three credit hours selected from sophomore literature courses (200 level) or foreign language literature (300 level or higher).
 - b) Three credit hours selected from the following (excluding skills courses): art and architectural history, drama, foreign language literature, humanities, music, philosophy, religion, sophomore literature courses, and visual arts.
3. A minimum of six credit hours in social sciences, selected from anthropology, economics, geography, history, political science, psychology, and sociology.

Additional requirements (e.g., an economics or second literature course) may be specified by individual departments. Students should consult with their academic advisors for details.

Courses which can be taken to satisfy requirements 1, 2, and 3 above must be selected from the approved list available from the departmental advisor.

Policy on Electives for Engineering Curricula

Class advisors must approve any course taken for elective credit in the Engineering curricula. Courses excluded for elective credit in the Engineering curricula are as follows: ENGL 100, MTHSC 101, 102, 104, 105, 115, 116, 215, 216, PHYS 207, 208.

Registration Requirements

A cumulative grade-point ratio of 2.0 or higher is required for registration in all engineering courses numbered 300 or higher. For registration in all engineering courses, preference is given to those majors for whom the course is a degree requirement, until registration is open for all students. Exceptions to this policy may be granted by the department offering the course.

Graduation Requirements

In addition to other institutional requirements, candidates for a baccalaureate degree in Engineering are required to have a 2.0 or higher cumulative grade-point ratio in all engineering courses taken at Clemson University. All courses utilizing the word "Engineering" in the course designator (e.g., E G 209, M E 493, etc.) are included in this calculation.

The baccalaureate degree programs in Engineering are designed to be completed within four years (8 regular semesters). Taking a reduced course load or participating in cooperative education will extend this time. On average, Clemson engineering students take approximately four and one-half years to complete the requirements for graduation.

AGRICULTURAL ENGINEERING Bachelor of Science

The Agricultural Engineering program is administered jointly by the College of Engineering and Science and the College of Agriculture, Forestry and Life Sciences. Refer to page 37 for the complete curriculum.

CERAMIC ENGINEERING Bachelor of Science

Ceramic engineers are producers of ceramic products. Ceramic engineers provide the professional engineering skills and talent necessary for research, design, production supervision, technical sales and management. Ceramics covers an extremely broad range of products. Common brick, window glass, wall and floor tile, dinner plates, bathroom fixtures, glass bottles, optical fiber glass, ceramic bones and teeth, solid-state electronic devices, nuclear fuel, machine tool bits, automotive engine valves, textile thread guides, and helicopter rotor blades are illustrations of the wide product line from a \$40 billion a year ceramic industry.

The curriculum has about 75 percent of the coursework devoted to general and background material common to all engineering disciplines. The core courses cover mathematics, basic sciences, engineering sciences, humanities and social sciences. The remaining 25 percent is devoted to fundamental ceramic engineering topics such as high temperature kinetics and chemistry, processing from raw materials to finished product, and materials and product characterization and properties.

The program leads to the Bachelor of Science degree in Ceramic Engineering. Advanced degrees are available with further study.

Sophomore Year

First Semester

- 3 - CR E 201 Intro. to Ceramic Engineering
- 3 - CR E 204 Laboratory Procedures
- 3 - E M 201 Engineering Mechanics: Statics
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II

16

Second Semester

- 3 - CR E 202 Proc. Cer. Raw Mat. into Products
- 3 - CR E 210 Introduction to Materials Science
- 2 - E G 209 Intro. to Engr./Comp. Graphics
- 3 - ENGL 314 Technical Writing
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - Elective

18

Junior Year

First Semester

- 3 - CH 331 Physical Chemistry
- 3 - CR E 302 Thermo-Chemical Ceramics
- 3 - CR E 304 Experimental Design
- 2 - E C 307 Basic Electrical Engineering
- 1 - E C 309 Electrical Engineering Lab. 1
- 3 - E M 304 Mechanics of Materials
- 3 - Literature Requirement¹

18

Second Semester

- 2 - CR E 307 Thermal Processing of Ceramics
- 1 - CR E 308 Thermal Proc. of Ceramics Lab.
- 3 - CR E 311 Kinetics of Materials Processes
- 2 - CR E 317 Industrial Combustion
- 1 - CR E 318 Combustion Lab.
- 3 - SPCH 250 Public Speaking
- 3 - Humanities/Social Science Requirement
- 3 - Mathematical Sciences/Statistics Requirement

18

Senior Year

First Semester

- 3 - CR E 402 Solid State Ceramics
- 3 - CR E 407 Senior Design Project
- 3 - CR E 418 Process Control
- 3 - CR E 450 Safety and Environmental Concerns in Ceramic Manufacturing
- 3 - Humanities/Social Science Requirement
- 3 - Elective

18

Second Semester

- 3 - CR E 403 Glasses
- 3 - CR E 430 Fine Particle Proc. in Ceramic Syst.
- 3 - I E 384 Engineering Economic Analysis or
- 3 - C E 425 Civil Engr. Project Evaluation
- 3 - Humanities/Social Science Requirement
- 4 - Elective

16

136 Total Semester Hours

¹ENGL 202, 203, 204, 205, 206, 207, 208, 209 or 300-level foreign language literature courses.

Note: Courses used to satisfy General Education Requirements for writing, oral and computer content have been selected and will be identified in next year's catalog. (See advisor.)

CHEMICAL ENGINEERING Bachelor of Science

Chemical Engineering is based on the sciences of chemistry, physics and mathematics. The curriculum emphasizes a broad range of fundamental principles in science and engineering as well as communications skills and humanities. As a result, graduates are avidly sought by industries in many areas of technology such as petrochemicals and petroleum, synthetic fibers and textiles, pharmaceu-

ticals, pulp and paper, computers, foods, metals, ceramics, instrumentation and automatic control, and polymers and plastics, as well as the traditional chemical process industries. Chemical engineers are in the forefront of environmental pollution prevention and remediation and are leading the way in applying engineering technology to the solution of medical and health-related problems. Advanced structural materials, electronic and photonic devices, and biotechnology are just some of the exciting new fields in which chemical engineers are making pivotal contributions.

A broad, fundamental background prepares the chemical engineering graduate for a wide variety of careers—in basic research and development, engineering design of new plants, operations and management of production facilities, or technical marketing and sales. The careers of many chemical engineers lead to top executive positions. By the judicious choice of electives made with the help of an advisor, a chemical engineering student may tailor his/her education to a specific career objective. Many students use electives to prepare for entry into professional schools, such as medicine, dentistry, law, or business, or for specialization in technical areas such as environmental control or polymer processing. The Department of Chemical Engineering offers advanced study leading to the Master of Science and Doctor of Philosophy degrees.

Sophomore Year

First Semester

- 3 - CH 223 Organic Chemistry
- 4 - CH E 211 Intro. to Chemical Engineering
- 2 - E G 209 Intro. to Engr./Comp. Graphics
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 3 - Literature Requirement¹

19

Second Semester

- 3 - CH 224 Organic Chemistry
- 1 - CH 229 Organic Chemistry Lab.
- 3 - CH E 220 Chemical Engr. Thermodynamics I
- 3 - E M 201 Engineering Mechanics: Statics
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - Literature Requirement¹

17

Junior Year

First Semester

- 1 - CH 339 Physical Chemistry Lab.
- 3 - CH E 311 Fluid Flow
- 3 - CH E 319 Engineering Materials
- 3 - CH E 321 Chemical Engr. Thermodynamics II
- 3 - MTHSC 302 Statistics for Science and Engr. or
- 3 - EX ST 411 Statistical Methods for Process Development Control
- 3 - Humanities/Social Science Requirement¹
- 3 - Elective

19

Second Semester

- 3 - CH 332 Physical Chemistry
- 1 - CH 340 Physical Chemistry Lab.
- 3 - CH E 307 Unit Operation Lab. 1
- 3 - CH E 312 Heat and Mass Transfer
- 3 - CH E 353 Process Dynamics and Control
- 3 - Humanities/Social Science Requirement¹

16

Senior Year**First Semester**

- 3 - CH E 407 Unit Operations Lab. II
- 3 - CH E 413 Separation Processes
- 3 - CH E 431 Process Development, Design and Optimization of Chemical Engr. Systems I
- 1 - CH E 443 Chemical Engr. Senior Seminar I
- 3 - CH E 450 Chemical Reaction Engineering
- 3 - Technical Requirement²

16

Second Semester

- 5 - CH E 432 Process Development, Design and Optimization of Chemical Engr. Systems II
- 1 - CH E 444 Chemical Engr. Senior Seminar II
- 3 - Advanced Chemistry Requirement³
- 3 - Technical Requirement²
- 7 - Elective

19

138 Total Semester Hours

¹See Policy on Humanities and Social Sciences for Engineering Curricula. (Fifteen hours are required. Chemical engineering majors must include six hours selected from ENGL 202, 203, 204, 205, 206, 207, 208, and 209, or from 300-level foreign language literature courses).

²See advisor for Technical Requirement for chemical engineering majors. (Six hours are required.)

³See advisor for Advanced Chemistry Requirement for chemical engineering majors. (Three hours are required.)

Notes:

- 1. No student may exceed a maximum of two attempts, including a W, to successfully complete any CH E course.
- 2. Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)

CIVIL ENGINEERING**Bachelor of Science**

Civil Engineering involves the planning, design, construction, maintenance, and operation of facilities and systems to control and improve the environment for modern civilization. Civil engineering is the broadest of the engineering professions, being the stem from which most other branches of engineering have developed.

The program in Civil Engineering leads to the Bachelor of Science degree and is designed to provide the graduate with a knowledge of basic science, engineering science, and engineering design. The civil engineering graduate is prepared to work immediately upon graduation in most areas of the profession, including traffic and transportation engineering, structural engineering, construction, soils and foundation engineering, coastal engineering, water resources engineering, environmental engineering, and others. The civil engineering student is also educated in the humanities, social sciences, and in economic issues because a concerned society demands economy as well as a realistic consideration of the human impacts of large engineering projects.

Graduates are encouraged to become registered professional engineers and to continue their education throughout their careers. Some find that programs in Civil Engineering provide excellent preparation for careers in technical sales and management.

Sophomore Year**First Semester**

- 2 - C E 250 Creative Problem Solving I
- 3 - C E 251 Analysis Techniques in Civil Engr.
- 2 - E G 209 Intro. to Engr./Comp. Graphics
- 3 - E M 201 Engineering Mechanics: Statics
- 3 - EX ST 301 Introductory Statistics or
- 3 - MTHSC 302 Stats. for Science and Engr.
- 4 - MTHSC 206 Calculus of Several Variables

17

Second Semester

- 3 - C E 253 Civil Engineering
- 4 - C E 254 Strength of Materials
- 3 - E M 202 Engineering Mechanics: Dynamics
- 3 - ENGL 314 Technical Writing
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations

17

Junior Year**First Semester**

- 3 - C E 300 Structural Systems Design
- 4 - C E 341 Introduction to Fluid Mechanics
- 3 - C E 350 Economic Evaluation of Projects
- 3 - C E 351 Civil Engineering
- 3 - E S E 401 Environmental Engineering
- 2 - Elective

18

Second Semester

- 3 - C E 311 Transportation Engr. Plan. and Design
- 4 - C E 321 Geotechnical Engineering
- 3 - C E 331 Construction Engineering and Mgt.
- 3 - C E 342 Applied Hydraulics and Hydrology
- 3 - Humanities/Social Science Requirement¹
- 2 - Elective

18

Senior Year**First Semester**

- 2 - C E 450 Creative Problem Solving II
- 1 - C E 451 Professional Seminar
- 3 - PHYS 221 Physics with Calculus II
- 3 - Humanities/Social Science Requirement¹
- 3 - Technical Requirement²
- 6 - Elective

18

Second Semester

- 3 - C E 459 Capstone Design Project
- 3 - Humanities/Social Science Requirement¹
- 3 - Literature Requirement³
- 6 - Technical Requirement²

15

135 Total Semester Hours

¹See department policy on Humanities/Social Science Requirements.

²See department policy on Technical Requirement.

³Must be selected from sophomore literature courses (200 level only) or foreign language literature (300 level or higher).

Notes:

- 1. Civil Engineering students may neither enroll nor receive credit for C E or E M courses unless they have a grade of C or higher in course prerequisites that have a C E or E M designation.
- 2. Courses used to satisfy General Education Requirements for writing, oral and computer content have been selected and will be identified in next year's catalog. (See advisor.)

COMPUTER ENGINEERING**Bachelor of Science**

The program in Computer Engineering leading to the Bachelor of Science degree provides an in-depth education into a wide range of computer topics including computer hardware, software and applications. Emphasis is placed on giving students hands-on experience with computers of all sizes (micro, mini, and large) by solving a wide range of real-world problems using engineering principles.

The career opportunities for computer engineers are excellent. The rapid advances in microelectronics and growth of microcomputer applications, as well as continued expansion of large computer systems, indicate that this strong demand will continue.

The curriculum is based on three main concepts: (1) It is an engineering curriculum which provides a solid foundation in mathematics, basic sciences, and the humanities while emphasizing the engineering approach to problem solving. (2) The required computer courses provide an excellent knowledge of hardware, software, and systems. (3) A large number of elective hours are provided to allow students to specialize in one or more computer areas. The Computer Engineering program prepares students for entering the engineering profession in a rapidly advancing area, and it provides a good background for study in other professions.

Sophomore Year**First Semester**

- 4 - CP SC 210 Programming Methodology¹
- 3 - E C E 201 Logic and Computing Devices
- 3 - E C E 202 Electric Circuits I
- 1 - E C E 211 Electrical Engineering Lab. I
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II

18

Second Semester

- 3 - CP SC 340 Algorithms and Data Structures¹ or
- 4 - CP SC 241 Computer Science IV
- 1 - E C E 212 Electrical Engineering Lab. II
- 3 - E C E 262 Electric Circuits II
- 4 - E C E 272 Computer Organization
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - MTHSC 311 Linear Algebra

18

Junior Year**First Semester**

- 1 - E C E 311 Electrical Engineering Lab. III
- 3 - E C E 320 Electronics I
- 3 - E C 329 Computer Systems Structures
- 3 - E C 330 Signals, Systems, and Transforms
- 4 - E C 371 Microcomputer Interfacing
- 3 - MTHSC 419 Discrete Math. Structures I
- 1 - Elective

18

Second Semester

- 3 - ECON 200 Economic Concepts or
- 3 - ECON 211 Prin. of Microeconomics or
- 3 - ECON 212 Principles of Macroeconomics
- 3 - MTHSC 400 Theory of Probability

- 3 - Engineering Science Requirement²
- 3 - Humanities/Social Science Requirement³
- 3 - Oral Communication Requirement⁴
- 3 - Elective

18

Senior Year

First Semester

- 3 - E C E 417 Elements of Software Design
- 3 - E C E 426 Digital Computer Design
- 3 - Application Sequence Requirement^{2,3}
- 3 - Design Requirement^{2,3}
- 3 - Humanities/Social Science Requirement³
- 3 - Elective

18

Second Semester

- 3 - E C E 452 Programming Systems
- 3 - E C E 453 Software Practicum
- 3 - Computer Engineering Requirement^{2,3}
- 3 - Design Requirement^{2,3}
- 3 - Literature Requirement³
- 3 - Elective

18

140 Total Semester Hours

¹CP SC 241 (four credits) is an approved substitute for CP SC 340. A minor in Computer Science requires CP SC 340. CP SC 102 is an approved substitute for CP SC 210.

²Application Sequence Requirements, Computer Engineering Requirements, Design Requirements, and Engineering Science Requirements must be chosen from a list of courses approved by the department.

³See Policy on Humanities and Social Sciences for Engineering Curricula.

⁴Oral Communication Requirement is specified by a list of courses approved by the department.

⁵One course that satisfies either the Design Requirement, Application Sequence Requirement, or Computer Engineering Requirement must also satisfy the Probability and Statistics Requirement. (The Probability and Statistics Requirement is specified by a list of courses approved by the department.)

Notes:

1. A student is allowed to enroll in E C E courses (excluding E C E 307, 308, 309, 310) only when all prerequisites, as defined by current official listings for that course, have been passed with a grade of C or higher.
2. All Computer Engineering students must have a cumulative Engineering grade-point ratio of 2.0 to enroll in any 300- or 400-level E C E courses.
3. No student may exceed a maximum of two attempts, including a W, to successfully complete any E C E course.
4. Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)

ELECTRICAL ENGINEERING

Bachelor of Science

Responsibilities of the electrical engineer range from analytical problem solving to the design of components and systems. These activities are performed in a variety of industrial areas and service sectors. The scope of employment opportunities requires a unique breadth and depth of knowledge and technical skills, which are reflected in the Electrical Engineering program. This program also offers an excellent preparation for graduate education.

Building on a foundation of mathematical and physical sciences, the student progresses into the application of this foundation in the areas of circuits, analog and digital electronics, communications, controls, power, and electromagnetics. In these areas, the student also begins to apply the concepts and techniques being learned to the design of circuits and systems.

In addition to these technical skills, the student learns to communicate effectively, both orally and with the written word. Because the engineer works for the benefit of society, the curriculum includes a strong component of humanities and social science electives. Also, many project design assignments enable the development of interpersonal, teamwork and management skills which are necessary for success in a professional engineering career.

A broad array of senior technical design electives in the areas of communications and signal processing, controls and robotics, electrical power systems, electromagnetics, electronics, and computer applications offer the opportunity to build depth in a selected area of expertise.

Sophomore Year

First Semester

- 2 - CP SC 157 Introduction to C Programming
- 3 - E C E 201 Logic and Computing Devices
- 3 - E C E 202 Electric Circuits I
- 1 - E C E 211 Electrical Engineering Lab. I
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II

16

Second Semester

- 1 - E C E 212 Electrical Engineering Lab. II
- 3 - E C E 262 Electric Circuits II
- 3 - E C E 272 Computer Organization
- 3 - E M 201 Engineering Mechanics: Statics
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - Elective

18

Junior Year

First Semester

- 1 - E C E 311 Electrical Engineering Lab. III
- 3 - E C E 320 Electronics I
- 3 - E C E 330 Signals, Systems, and Transforms
- 4 - E C E 371 Microcomputer Interfacing
- 3 - E C E 380 Electromagnetics
- 3 - Technical Requirement (Advanced Mathematics)¹

17

Second Semester

- 1 - E C E 312 Electrical Engineering Lab. IV
- 3 - E C E 317 Random Signal Analysis
- 3 - E C E 321 Electronics II
- 3 - E C E 360 Electrical Power Engineering
- 3 - E C E 381 Field, Waves, and Circuits
- 3 - Humanities/Social Science Requirement²

16

Senior Year

First Semester

- 3 - E C E 409 Continuous and Discrete Syst. Des.
- 3 - E C E 427 Communication Systems
- 2 - E C E 495 Integrated System Design I

- 3 - M E 310 Thermodynamics and Heat Transfer
- 3 - Literature Requirement²
- 3 - Technical Requirement (Electrical and Computer Engineering)¹

17

Second Semester

- 2 - E C E 496 Integrated System Design II
- 6 - Humanities/Social Science Requirement²
- 3 - Technical Requirement (Electrical and Computer Engineering)¹
- 7 - Elective

18

134 Total Semester Hours

¹The Technical Requirement (Advanced Mathematics) and Technical Requirement (Electrical and Computer Engineering) are to be selected from lists that are maintained in the Electrical Engineering Program Office.

²See Policy on Humanities and Social Sciences for Engineering Curricula.

Notes:

1. A student is allowed to enroll in E C E courses (excluding E C E 307, 308, 309) only when all prerequisites have been passed with a grade of C or higher.
2. All Electrical Engineering students must have a cumulative Engineering grade-point ratio of 2.0 to enroll in any 300- or 400-level E C E courses. In addition, no student may exceed a maximum of two attempts, including a W, to successfully complete any E C E course.
3. Courses used to satisfy the General Education Requirements for writing, oral and computer content have been selected and will be identified in next year's catalog. (See advisor.)

ENGINEERING ANALYSIS

Bachelor of Science

This curriculum is a four-year engineering science-oriented course of study. Its objectives are twofold: (1) to prepare students for graduate study in some specialized areas of engineering; and (2) to provide a flexible and broad-based engineering preparation for students planning to enter professional schools in areas such as medicine or law.

The curriculum leads to the Bachelor of Science in Engineering Analysis. Due to its flexible nature, requirements for this degree are stated in terms of subject matter area rather than in terms of specific courses. Additional details on the curriculum requirements are available in the Office of the Associate Dean for Undergraduate Studies.

The Freshman Curriculum (page 70) is included in the following table:

- 12 - Area of Concentration
- 16 - Basic Science (including eight hours of physics)
- 33 - Engineering Science
- 32 - Humanities/Social Science Requirement
- 24 - Mathematical Sciences (including 12 hours of post-calculus mathematical sciences)
- 22 - Electives
- 139 - Total Semester Hours

One of several available concentration areas must be chosen by the student. The selection of specific courses, particularly in the junior and senior years, will then depend primarily on the chosen concentration area.

INDUSTRIAL ENGINEERING

Bachelor of Science

Industrial engineers design, install, and improve the complex systems which provide goods and services vital to our society and economy. These systems integrate people, materials, and equipment and thereby place unique demands for breadth of preparation upon industrial engineers. Knowledge is required in mathematical, physical, and social sciences; economic, operational, and engineering analyses; and the principles and techniques of engineering design. Because of the closeness of industrial engineering problems to management, a special need exists for industrial engineers to be able to work and communicate with managers.

The traditional arenas for the practice of industrial engineering are the manufacturing facilities of industry; however, fully one-third of practicing industrial engineers today are employed in nonmanufacturing institutions such as hospitals and banks and in government service. The department emphasizes quality, ergonomics, and design in these nontraditional areas, as well as the changing manufacturing world, in preparing students both for professional practice and further study.

In addition to numerous employment opportunities, an industrial engineering graduate may further his/her formal education. The Department of Industrial Engineering offers programs leading to the Master of Science and Doctor of Philosophy degrees.

Current curriculum and department information is available electronically at ie.eng.clemson.edu by gopher, www, and anonymous ftp.

Sophomore Year

First Semester

- 3 - CR E 210 Introduction to Material Science
- 2 - E G 209 Intro. to Engr./Comp. Graphics
- 3 - I E 201 Systems Design I
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 2 - Elective

17

Second Semester

- 3 - E M 201 Engineering Mechanics: Statics
- 4 - I E 210 Design and Analysis of Work Systems
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - MTHSC 302 Statistics for Science and Engr.
- 3 - SPCH 250 Public Speaking

17

Junior Year

First Semester

- 3 - E M 304 Mechanics of Materials
- 3 - I E 320 Design of Information Systems in Industrial Engineering
- 3 - I E 380 Methods of Operations Research I
- 3 - I E 384 Engineering Economic Analysis
- 3 - M E 310 Thermodynamics and Heat Transfer
- 2 - Elective

17

Second Semester

- 2 - E C E 307 Basic Electrical Engineering
- 1 - E C E 309 Electrical Engineering Lab. I
- 3 - ENGL 314 Technical Writing
- 3 - I E 340 Systems and Flow
- 4 - I E 361 Industrial Quality Control
- 3 - I E 381 Methods of Operation Research II

16

Senior Year

First Semester

- 3 - I E 461 Quality Engineering
- 3 - I E 482 Systems Modeling
- 3 - I E 486 Production Planning and Control
- 3 - Humanities/Social Science Requirement¹
- 3 - Literature Requirement²

15

Second Semester

- 3 - I E 467 Systems Design II
- 1 - I E 468 Design Problems in Industrial Engr.
- 6 - Humanities/Social Science Requirement¹
- 6 - Elective

16

130 Total Semester Hours

¹See advisor.²Select from sophomore literature (200 level only) or foreign language literature (300 level or higher).

Notes:

- 1. *Baccalaureate Degree Requirement*—In each I E course taken, a student must make a grade of C or higher.
- 2. *Course Enrollment Requirement*—A student is allowed to enroll in I E courses only when all prerequisites, as defined by the current official listings for those courses, have been passed with a grade of C or higher.

MECHANICAL ENGINEERING

Bachelor of Science

Breadth, individuality, and flexibility are inherent characteristics of the profession of mechanical engineering. Mechanical engineers, in a broad sense, make major contributions to the creation of products and systems that benefit mankind. They work in a wide variety of areas including bioengineering, energy systems, environmental and life-support systems, propulsion and transportation systems, food production, materials processing, automated manufacturing, and construction. A wide spectrum of career opportunities is open to them.

The practice of mechanical engineering includes one or more of the following activities: manufacturing, testing, research, development, design, technical management, technical sales and marketing, construction, and teaching.

In preparing for a 40–45 year professional career, it is necessary to develop the whole person. This requires a balanced program encompassing the humanities, social sciences, communication and computer skills, physical and engineering sciences, design, and laboratory experience. The student starts with the physical sciences and communication skills and progresses through the engineering sciences, ultimately applying the principles learned in such areas as energy conversion and transfer, mechanical design, and systems analysis. Throughout the

curriculum, the fundamental nature of engineering as a problem-solving discipline is emphasized.

Most mechanical engineering graduates take positions in industry, government, or business. Many, however, continue their formal education in a graduate program. The Department of Mechanical Engineering offers study leading to the Master of Engineering, Master of Science, and Doctor of Philosophy degrees.

Sophomore Year

First Semester

- 2 - E G 209 Intro. to Engr./Comp. Graphics
- 3 - E M 201 Engineering Mechanics: Statics
- 3 - M E 202 Foundations of Mechanical Systems
- 2 - M E 205 Computer Analysis in Engineering
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II

17

Second Semester

- 2 - E C E 307 Basic Electrical Engineering
- 1 - E C E 309 Electrical Engineering Lab. I
- 3 - E M 202 Engineering Mechanics: Dynamics
- 3 - M E 203 Found. of Thermal and Fluid Syst.
- 1 - M E 221 Mechanical Engineering Lab. I
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - Humanities/Social Science Requirement^{1,2}

17

Junior Year

First Semester

- 3 - E M 304 Mechanics of Materials
- 3 - E M 320 Fluid Mechanics
- 3 - EX ST 411 Statistical Methods for Process Development and Control or
- 3 - MTHSC 302 Stats. for Science and Engr.
- 3 - M E 303 Thermodynamics
- 2 - M E 322 Mechanical Engineering Lab. II
- 3 - Humanities/Social Science Requirement^{1,2}

17

Second Semester

- 3 - M E 301 Materials for Mechanical Engineering Applications
- 3 - M E 304 Heat Transfer
- 3 - M E 305 Modeling and Analysis of Dynamic Systems
- 3 - M E 306 Fundamentals of Machine Design
- 2 - M E 323 Mechanical Engineering Lab. III
- 3 - Elective

17

Senior Year

First Semester

- 3 - M E 401 Mechanical Engineering Design
- 3 - M E 404 Manufacturing Processes and Their Application
- 1 - M E 424 Mechanical Engineering Lab. IV
- 3 - Literature Requirement^{2,3}
- 3 - Technical Requirement⁴
- 4 - Elective

17

Second Semester

- 1 - M E 400 Senior Seminar
- 3 - M E 402 Internship in Engineering Design
- 3 - Humanities/Social Science Requirement^{1,2}

6 - Technical Requirement¹**3 - Elective**

16

133 Total Semester Hours

¹Select from a list of approved Humanities/Social Science courses.

²Select to include at least one oral communication credit among all courses.

³Select from 200-level English literature or 300-level and higher foreign language literature courses.

⁴Select from the departmental list of approved courses with the assistance of a faculty advisor.

Notes:

1. A student is allowed to enroll in any M E or E M course only when all prerequisites, as defined by current official listings for that course, have been passed with a grade of C or higher.

2. Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)

SCIENCE PROGRAMS

The College offers curricula leading to the Bachelor of Science in Chemistry, Computer Information Systems, Computer Science, Geology, Mathematical Sciences and Physics. In addition, the Bachelor of Arts is offered with a major emphasis in Chemistry, Computer Science, Geology, Mathematical Sciences and Physics.

The science departments in the College work closely with the other academic departments in the University, including such disciplines as economics and management as well as engineering. This allows students in the sciences great flexibility and responsibility in designing their own programs.

Bachelor of Science Curricula

The Bachelor of Science degree prepares the graduate for professional employment or graduate study in the chosen science discipline. BS curricula are thus more highly structured than BA curricula, but nonetheless offer ample opportunity for students to pursue a minor or secondary area of interest.

Bachelor of Arts Curricula

The curricula leading to the Bachelor of Arts degree are designed to meet the needs of those students who desire a broad general education.

A student has a large degree of flexibility and responsibility in designing the minor area from any department in the University. All undergraduate minors are listed on pages 32–34. The courses for these minors are to be selected in consultation with the appropriate department.

To fulfill requirements for a major concentration, a student takes 24 semester hours credit from courses above the sophomore level including or in addition to certain courses specified by the major department. The minor concentration requires 15 credits from courses above the sophomore level. In some major and minor disciplines, certain prescribed courses at the sophomore level are counted toward the 24 and 15 credit-hour requirements.

Note: No science curriculum in the College leading to the Bachelor of Arts or Bachelor of Science degree will allow credit for AG ED 101, ENGL 100, MTHSC 104 or 105 to be used to satisfy requirements for graduation.

CHEMISTRY**Bachelor of Science**

Chemistry, an experimental discipline based on observation guided by molecular theory, is of fundamental importance in much of modern science and technology. Its molecular concepts form the basis for ideas about complex material behavior. Due to the fundamental nature and extensive application of chemistry, an unusually large variety of challenging opportunities to contribute in the science-oriented community are open to the student whose education is built around the principles of this discipline.

The curriculum, through the career requirement options and the large number of electives, provides each student an opportunity to select a coherent program of study beyond the basic courses. Career requirement options are provided for students anticipating graduate study in chemistry or related fields; employment following the BS degree in laboratory, production, technical sales or management positions; professional studies (e.g., medicine); chemical physics; geochemistry; and employment in fields requiring extensive preparation in courses other than sciences (e.g., patent law and technical writing). Significant features of the curriculum are the student's extensive participation in experimental work and the opportunity to take part in a research investigation during the junior and senior years.

Freshman Year**First Semester**

- 4 - CH 101 General Chemistry
- 1 - CH 141 Chemistry Orientation
- 3 - CP SC 110 Elem. Computer Programming
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I

15

Second Semester

- 4 - CH 102 General Chemistry
- 2 - CH 205 Introduction to Inorganic Chemistry
- 3 - ENGL 102 Composition II
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I

16

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 1 - PHYS 223 Physics Lab. II
- 4 - Foreign Language Requirement¹

16

Second Semester

- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - PHYS 222 Physics with Calculus III
- 1 - PHYS 224 Physics Lab. III
- 4 - Foreign Language Requirement¹

16

Junior Year**First Semester**

- 3 - CH 313 Quantitative Analysis
- 2 - CH 315 Quantitative Analysis Lab.
- 3 - CH 331 Physical Chemistry
- 1 - CH 339 Physical Chemistry Lab.
- 3 - Literature Requirement¹
- 3 - Humanities Requirement
- 3 - Oral Communication Requirement¹

18

Second Semester

- 3 - CH 332 Physical Chemistry
- 1 - CH 340 Physical Chemistry Lab.
- 3 - CH 411 Instrumental Analysis
- 2 - CH 412 Instrumental Analysis Lab.
- 3 - ENGL 314 Technical Writing
- 3 - Social Science Requirement

15

Senior Year**First Semester**

- 3 - CH 402 Inorganic Chemistry
- 3 - CH 443 Research Problems
- 3 - Chemistry Requirement⁴
- 3 - Social Science Requirement
- 6 - Elective

18

Second Semester

- 3 - CH 444 Research Problems
- 3 - Chemistry Requirement⁴
- 9 - Elective

15

129 Total Semester Hours

¹Two semesters of the same modern language.

²ENGL 202, 203, 204, 205, 206, 207, 208, 209.

³SPCH 150, 250, 251, or other O.3 course selected from departmental list.

⁴CH 421 and 435 are recommended for students qualifying for graduate studies.

CHEMISTRY**Bachelor of Arts****Freshman Year****First Semester**

- 4 - CH 101 General Chemistry
- 1 - CH 141 Chemistry Orientation
- 3 - CP SC 110 Elem. Computer Programming
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I

15

Second Semester

- 4 - CH 102 General Chemistry
- 2 - CH 205 Introduction to Inorganic Chemistry
- 3 - ENGL 102 Composition II
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I

16

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry¹
- 1 - CH 227 Organic Chemistry Lab.¹
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 4 - Foreign Language Requirement²

15

Second Semester

- 3 - CH 224 Organic Chemistry¹
- 1 - CH 228 Organic Chemistry Lab.¹
- 3 - HIST 172 Western Civilization
- 4 - Foreign Language Requirement²
- 3 - Literature Requirement³
- 3 - Elective

17

Junior Year**First Semester**

- 3 - CH 313 Quantitative Analysis
- 1 - CH 317 Quantitative Analysis Lab.
- 3 - HIST 173 Western Civilization
- 3 - Foreign Language Requirement²
- 3 - Humanities Requirement
- 3 - Minor

16

Second Semester

- 3 - CH 331 Physical Chemistry
- 3 - ENGL 314 Technical Writing
- 3 - Foreign Language Requirement²
- 3 - Minor
- 3 - Oral Communication Requirement⁴
- 3 - Elective

18

Senior Year**First Semester**

- 3 - CH 332 Physical Chemistry
- 3 - Chemistry Requirement
- 3 - Minor
- 9 - Elective

18

Second Semester

- 3 - Chemistry Requirement
- 3 - Minor
- 9 - Elective

15

130 Total Semester Hours

¹CH 223, 224, 225, 226 will count toward the 24 hours of the Chemistry major.²Four semesters of the same modern language.³ENGL 202, 203, 204, 205, 206, 207, 208, 209.⁴SPCH 150, 250, 251, or other 0.3 course selected from departmental list.**COMPUTER INFORMATION SYSTEMS****Bachelor of Science**

The Computer Information Systems degree program is oriented toward computer applications in management-related problems. The program emphasizes functional areas of management including accounting, production, marketing and finance, and the

applications of computers in these areas. The curriculum is designed to prepare students for careers in areas such as systems design and analysis, applications programming, database administration and information retrieval as well as for continued study toward an advanced degree.

Freshman Year**First Semester**

- 4 - CP SC 101 Computer Science I
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Humanities Requirement¹
- 4 - Natural Science Requirement²

18

Second Semester

- 4 - CP SC 102 Computer Science II
- 3 - ENGL 102 Composition II
- 4 - MTHSC 108 Calculus of One Variable II
- 4 - Natural Science Requirement²
- 3 - Social Science Requirement¹

18

Sophomore Year**First Semester**

- 1 - CP SC 221 Intro. to a Comp. Sci. Language
- 4 - CP SC 231 Computer Science III
- 3 - ECON 211 Principles of Microeconomics
- 3 - MTHSC 119 Introduction to Discrete Methods
- 3 - Literature Requirement³
- 3 - Natural Science Requirement²

17

Second Semester

- 3 - ACCT 203 Financial Accounting
- 4 - CP SC 241 Computer Science IV
- 1 - CP SC 291 Seminar in Professional Issues I
- 3 - MGT 301 Principles of Management
- 3 - MTHSC 210 Applied Matrix Algebra or
- 3 - MTHSC 311 Linear Algebra
- 3 - Social Science Requirement¹

17

Junior Year**First Semester**

- 3 - ACCT 307 Managerial Accounting
- 3 - CP SC 360 Peripherals and File Design
- 3 - MKT 301 Principles of Marketing
- 3 - MTHSC 302 Statistics for Science and Engr.
- 3 - SPCH 250 Public Speaking

15

Second Semester

- 3 - CP SC 332 Computer Systems⁴
- 1 - CP SC 361 Data Management Systems Lab.
- 3 - CP SC 372 Intro. to Software Development
- 3 - ENGL 314 Technical Writing
- 3 - FIN 306 Corporation Finance
- 3 - Elective

16

Senior Year**First Semester**

- 3 - CP SC 371 Systems Analysis
- 3 - CP SC 462 Database Management Systems
- 1 - CP SC 491 Seminar in Professional Issues II
- 3 - MGT 400 Mgt. of Organizational Behavior or
- 3 - MGT 390 Operations Management

- 3 - MGT 402 Operations Planning and Control

3 - Elective

16

Second Semester

- 3 - CP SC 463 Online Systems
- 3 - Commerce and Industry Requirement⁵
- 3 - Computer Science Requirement⁶
- 3 - Humanities/Social Science Requirement¹
- 4 - Elective

16

133 Total Semester Hours

¹Select to satisfy Humanities and Social Sciences section, General Education Requirements.²Must include one of the following sequences: BIOL 103, 104; CH 101, 102; PHYS 122/124, 221/223; PHYS 207, 208.³ENGL 202, 203, 204, 205, 206, 207, 208, 209.⁴For a stronger emphasis on operating systems, CP SC 422 may be substituted for CP SC 332.⁵Select from ACCT 410; MA SC 413, 414; MGT 404, 408, MKT 431.⁶Select from CP SC 330, 350, or any 400-level computer science course except CP SC 422.**Notes:**

1. For graduation, a candidate for the BS degree in Computer Information Systems must have earned a grade of C or better in each CP SC course applied to the degree.
2. Before enrolling in a CP SC course, a grade of C or better must be earned in all prerequisite courses (including CP SC, ECE, and MTHSC courses).

COMPUTER SCIENCE Bachelor of Science

The Computer Science degree program is oriented toward design, implementation, and application of computer software systems to solve information processing problems in general. An "applications emphasis" in an area outside of computer science allows the program to be tailored to the needs and interests of individual students. This curriculum is more technically oriented than the Computer Information Systems curriculum, and it prepares a student for employment in the computer software field or for continued study toward an advanced degree in computer science.

This program has been accredited by the Computer Science Accreditation Commission of the Computing Sciences Accreditation Board.

Freshman Year**First Semester**

- 4 - CP SC 101 Computer Science I
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Humanities Requirement¹
- 4 - Natural Science Requirement²

18

Second Semester

- 4 - CP SC 102 Computer Science II
- 3 - ENGL 102 Composition II
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - Natural Science Requirement²
- 3 - Social Science Requirement¹

17

Sophomore Year**First Semester**

- 1 - CP SC 221 Intro. to a Comp. Sci. Language
- 4 - CP SC 231 Computer Science III
- 3 - MTHSC 119 Introduction to Discrete Methods
- 3 - PHYS 122 Physics with Calculus I
- 1 - PHYS 124 Physics Lab. I
- 3 - Literature Requirement¹
- 3 - Elective

18

Second Semester

- 4 - CP SC 241 Computer Science IV
- 1 - CP SC 291 Seminar in Professional Issues I
- 3 - E C E 201 Logic and Computing Devices
- 3 - MTHSC 311 Linear Algebra
- 3 - PHYS 221 Physics with Calculus II
- 1 - PHYS 223 Physics Lab. II
- 3 - Social Science Requirement¹

18

Junior Year**First Semester**

- 4 - CP SC 330 Computer Systems Organization
- 3 - CP SC 360 Peripherals and File Design
- 3 - MTHSC 302 Statistics for Science and Engr.
- 3 - SPCH 250 Public Speaking
- 3 - Applications Emphasis⁴

16

Second Semester

- 3 - CP SC 350 Foundations of Computer Science
- 1 - CP SC 361 Data Management Systems Lab.
- 3 - CP SC 372 Intro. to Software Development
- 3 - ENGL 314 Technical Writing
- 3 - Applications Emphasis⁴
- 3 - Mathematical Sciences Requirement¹

16

Senior Year**First Semester**

- 3 - CP SC 422 Introduction to Operating Systems
- 3 - CP SC 428 Design and Implementation of Programming Languages
- 1 - CP SC 491 Seminar in Professional Issues II
- 3 - Applications Emphasis⁴
- 3 - Computer Science Requirement⁶
- 3 - Elective

16

Second Semester

- 3 - Applications Emphasis⁴
- 3 - Computer Science Requirement⁶
- 3 - Humanities/Social Sciences Requirement¹
- 3 - Nontechnical Elective¹
- 4 - Elective

16

135 Total Semester Hours

¹Select to satisfy Humanities and Social Sciences sections, General Education Requirements.²Select from the departmental list of approved natural science courses.³ENGL 202, 203, 204, 205, 206, 207, 208, 209.⁴Consists of 12 hours in an applications area as specified by the department.⁵Select from MTHSC 400, 405, 440, 441, 460 or other approved 400-level MTHSC courses.⁶Select from 400-level CP SC courses.⁷Select from departmental list.**Notes:**

1. For graduation, a candidate for the BS degree in Computer Science must have earned a grade of C or better in each CP SC course applied to the degree.

2. A grade of C or better must be earned in all prerequisite courses (including CP SC, E C E, and MTHSC courses) before enrolling in the next CP SC course.

COMPUTER SCIENCE**Bachelor of Arts**

The Bachelor of Arts in Computer Science is ideal for students interested in acquiring a broad-based liberal arts education that includes a strong and solid understanding of computer science. The degree program is oriented toward design, implementation, and application of computer software systems to solve information processing problems. The program prepares students for employment in the computer software field or for continued study toward an advanced degree in computer science.

Freshman Year**First Semester**

- 4 - CP SC 101 Computer Science I
- 3 - ENGL 101 Composition I
- 3 - HIST 172 Western Civilization
- 4 - MTHSC 106 Calculus of One Variable I
- 4 - Foreign Language Requirement¹

18

Second Semester

- 4 - CP SC 102 Computer Science II
- 3 - ENGL 102 Composition II
- 3 - HIST 173 Western Civilization
- 4 - MTHSC 108 Calculus of One Variable II
- 4 - Foreign Language Requirement¹

18

Sophomore Year**First Semester**

- 1 - CP SC 221 Intro. to a Comp. Sci. Language
- 4 - CP SC 231 Computer Science III
- 3 - MTHSC 119 Introduction to Discrete Methods
- 3 - Foreign Language Requirement¹
- 3 - Literature Requirement²
- 4 - Natural Science Requirement³

18

Second Semester

- 4 - CP SC 241 Computer Science IV
- 3 - Foreign Language Requirement¹
- 3 - Literature Requirement²
- 4 - Natural Science Requirement³
- 3 - Elective

17

Junior Year**First Semester**

- 3 - CP SC 360 Peripherals and File Design
- 3 - ENGL 314 Technical Writing
- 3 - MTHSC 311 Linear Algebra
- 3 - Computer Science Requirement⁴
- 3 - Minor

15

Second Semester

- 3 - CP SC 372 Intro. to Software Development
- 3 - SPCH 250 Public Speaking
- 3 - Computer Science Requirement⁴
- 6 - Minor

15

Senior Year**First Semester**

- 6 - Computer Science Requirement⁴
- 3 - Fine Arts Requirement⁵
- 3 - Minor
- 3 - Restricted Elective⁶

15

Second Semester

- 3 - Computer Science Requirement⁴
- 3 - Minor
- 8 - Elective

14

130 Total Semester Hours

¹Four semesters of the same language.²ENGL 202, 203, 204, 205, 206, 207, 208, 209.³Must be one of the following sequences: BIOL 103, 104; CH 101, 102 or 112; PHYS 122/124, 221/223; PHYS 207, 208.⁴Must include at least nine credit hours chosen from CP SC 350 and 400-level computer science courses.⁵Select from MUSIC 210, 311, Art or Architectural History.⁶Select from philosophy, anthropology (except 251), political science, HIST 198 (three times), 200-level English literature and 300-level foreign language literature.**Notes:**

1. For graduation, a candidate for the BA degree in Computer Science must have earned a grade of C or better in each CP SC course applied to the degree.

2. A grade of C or better must be earned in all prerequisite courses (including CP SC, E C E, and MTHSC courses) before enrolling in the next CP SC course.

GEOLOGY**Bachelor of Science**

Geology involves the physics and chemistry of materials which comprise the earth, but equally important, it considers the development of life on earth. Fundamentally, the chemical, physical and biological responses to environments on and in the earth must be thoroughly understood so that the historical development of the earth can be deduced, predictions of the future inferred, and natural resources intelligently developed. Industry is dependent on minerals and rocks. Metals have their origin in them as do our chief power sources: coal, petroleum, and radioactive minerals. The power and wealth of nations depend largely on their exploration, control and development of mineral wealth.

Geologists are entering a new era. Widening horizons are indicated by employment not only in mineral-producing industries but by railroads, municipalities, engineering firms, and water authorities. For this reason, it is important that the geologist's education rest on a broad yet rigorous base.

Students pursuing a Bachelor of Science degree in Geology have three study areas from which to choose. The "traditional" curriculum provides students with the fundamentals of geology and excellent support in the other basic sciences. Upon completion of this curriculum, students should be

prepared for employment or for graduate study in any field of geology. The Environmental Geology study area is designed to prepare students for careers in the environmental consulting industry. Students in this study area must take 15 credits of Environmental Science Requirement, including at least nine credits from one of three subdisciplines: geology/soil science, biology/ecology, or chemistry/physics. The Engineering Geology study area can be taken by students interested in applying engineering principles to geologic problems. Engineering geologists are increasingly called upon to perform geologic site evaluations for construction projects and to minimize the threat of geologic hazards. The curriculum involves courses in engineering and soil mechanics plus 15 credits of Engineering Geology Requirement selected from courses in civil, environmental systems, and agricultural engineering, or advanced mathematics.

Freshman Year

First Semester

- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 1 - GEOL 100 Current Topics in Geology
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Social Sciences Requirement¹

15

Second Semester

- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 3 - GEOL 101 Physical Geology
- 1 - GEOL 103 Physical Geology Lab.
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I

18

Sophomore Year

First Semester

- 4 - BIOL 103 General Biology I
- 4 - GEOL 102 Historical Geology
- 4 - GEOL 306 Mineralogy
- 4 - MTHSC 206 Calculus of Several Variables

16

Second Semester

- 3 - GEOL 310 Optical Mineralogy
- 3 - SPCH 250 Public Speaking
- 3 - Computer Skills Requirement^{1,2}
- 3 - Literature Requirement³

3 - Elective

15

Junior Year

First Semester

- 4 - ENGL 314 Technical Writing
- 4 - GEOL 302 Structural Geology
- 4 - GEOL 314 Sedimentary Petrology
- 3 - PHYS 221 Physics with Calculus II
- 3 - Social Sciences Requirement¹

16

Second Semester

- 3 - EX ST 301 Introductory Statistics
- 3 - GEOL 316 Igneous and Metamorphic Petrology
- 3 - PHYS 222 Physics with Calculus III
- 3 - Humanities Requirement¹
- 3 - Elective

15

Summer

- 6 - Summer Geology Field Course⁴

Senior Year

First Semester

- 3 - GEOL 403 Invertebrate Paleontology
- 3 - Geology Requirement⁴
- 3-4 - Technical Requirement⁴
- 6-5 - Elective

15

Second Semester

- 3 - GEOL 413 Stratigraphy
- 3 - Geology Requirement⁵
- 3-4 - Technical Requirement⁴
- 5-4 - Elective

14

130 Total Semester Hours

¹See General Education Requirements.²Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)³ENGL 202, 203, 204, 205, 206, 207, 208, 209.⁴Select from departmental list of approved summer geology field courses.⁵Select from 400-level geology courses.⁶Choose any two courses from AGRON 202, 475, BIOL 104, BIOSC 303 or 304, C E 201, 417, CH 201, 331, 332, CR E 210, E M 201, 304, MTHSC 208, 360, 434, PHYS 441, 446.

ENGINEERING GEOLOGY STUDY AREA

Freshman Year

First Semester

- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 1 - GEOL 100 Current Topics in Geology
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Social Sciences Requirement¹

15

Second Semester

- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 3 - GEOL 101 Physical Geology
- 1 - GEOL 103 Physical Geology Lab.
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I

18

Sophomore Year

First Semester

- 4 - GEOL 102 Historical Geology
- 4 - GEOL 306 Mineralogy
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - Literature Requirement²

15

Second Semester

- 3 - C E 201 Surveying
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - SPCH 250 Public Speaking
- 3 - Computer Skills Requirement^{1,3}
- 3 - Social Sciences Requirement¹

16

Junior Year

First Semester

- 3 - E M 201 Engineering Mechanics: Statics
- 3 - ENGL 314 Technical Writing
- 4 - GEOL 302 Structural Geology
- 3 - PHYS 221 Physics with Calculus II
- 3 - Engineering Geology Requirement⁴

16

Second Semester

- 3 - E M 304 Mechanics of Materials or
- 3 - C E 220 Mech. and Materials in Civil Engr.
- 3 - EX ST 301 Introductory Statistics
- 3 - GEOL 320 Engineering Geology
- 3 - PHYS 222 Physics with Calculus III
- 3 - Humanities Requirement¹

15

Summer

- 6 - Summer Geology Field Course⁵

Senior Year

First Semester

- 3 - GEOL 408 Geohydrology
- 6 - Engineering Geology Requirement⁴
- 6 - Elective

15

Second Semester

- 6 - Engineering Geology Requirement⁴
- 3 - Geology Requirement⁴
- 5 - Elective

14

130 Total Semester Hours

¹See General Education Requirements.²ENGL 202, 203, 204, 205, 206, 207, 208, 209.³Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See Advisor.)⁴Select from departmental list of approved courses. A minimum of 15 credits is required.⁵Select from departmental list of approved summer geology field courses.⁶Select from 300- or 400-level geology courses.

ENVIRONMENTAL GEOLOGY STUDY AREA

Freshman Year

First Semester

- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 1 - GEOL 100 Current Topics in Geology
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - Social Sciences Requirement¹

15

Second Semester

- 4 - CH 102 General Chemistry
- 3 - ENGL 102 Composition II
- 3 - GEOL 101 Physical Geology
- 1 - GEOL 103 Physical Geology Lab.
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I

18

Sophomore Year**First Semester**

- 4 - BIOL 103 General Biology I
 - 4 - GEOL 102 Historical Geology
 - 4 - GEOL 306 Mineralogy
 - 4 - MTHSC 206 Calculus of Several Variables
- 16

Second Semester

- 4 - BIOL 104 General Biology II
 - 3 - EN SP 200 Intro. to Environmental Science
 - 3 - SPCH 250 Public Speaking
 - 3 - Computer Skills Requirement^{1,2}
 - 3 - Literature Requirement¹
- 16

Junior Year**First Semester**

- 3 - ENGL 314 Technical Writing
 - 4 - GEOL 302 Structural Geology
 - 3 - Environmental Science Requirement⁴
 - 3 - Social Sciences Requirement¹
 - 2 - Elective
- 15

Second Semester

- 3 - EX ST 301 Introductory Statistics
 - 3 - GEOL 400 Environmental Geology
 - 3 - Environmental Science Requirement⁴
 - 3 - Humanities Requirement¹
 - 3 - Elective
- 15

Summer

- 6 - Summer Geology Field Course⁵

Senior Year**First Semester**

- 2 - EN SP 472 Environ. Planning and Control or
 - 3 - LAW 429 Environmental Law and Policy
 - 3 - GEOL 408 Geohydrology
 - 6 - Environmental Science Requirement⁴
 - 3-2 - Elective
- 14

Second Semester

- 3 - EN SP 400 Studies in Environmental Science
 - 3 - Environmental Science Requirement⁴
 - 3 - Geology Requirement⁶
 - 6 - Elective
- 15

130 Total Semester Hours

¹See General Education Requirements.

²Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See Advisor.)

³ENGL 202, 203, 204, 205, 206, 207, 208, 209

⁴Select from departmental list of approved courses. A minimum of 15 credits is required.

⁵Select from departmental list of approved summer geology field courses.

⁶Select from 300- or 400-level geology courses.

GEOLOGY**Bachelor of Arts****Freshman Year****First Semester**

- 4 - CH 101 General Chemistry
 - 3 - ENGL 101 Composition I
 - 1 - GEOL 100 Current Topics in Geology
 - 3 - MTHSC 101 Introduction to Probability or
 - 4 - MTHSC 106 Calculus of One Variable I
 - 4 - Foreign Language Requirement¹
- 15-16

Second Semester

- 4 - CH 102 General Chemistry
 - 3 - ENGL 102 Composition II
 - 3 - GEOL 101 Physical Geology
 - 1 - GEOL 103 Physical Geology Lab.
 - 3 - MTHSC 102 Intro. to Math. Analysis or
 - 4 - MTHSC 108 Calculus of One Var. II
 - 4 - Foreign Language Requirement¹
- 18-19

Sophomore Year**First Semester**

- 4 - GEOL 102 Historical Geology
 - 4 - GEOL 306 Mineralogy
 - 3 - HIST 172 Western Civilization
 - 3 - Foreign Language Requirement¹
 - 3 - Literature Requirement²
- 17

Second Semester

- 3 - HIST 173 Western Civilization
 - 3 - SPCH 250 Public Speaking
 - 3 - Foreign Language Requirement¹
 - 3 - Literature Requirement²
 - 3 - Elective
- 15

Junior Year**First Semester**

- 4 - GEOL 302 Structural Geology
 - 3 - Computer Skills Requirement^{1,4}
 - 3 - Major³
 - 3 - Minor
 - 3 - Elective
- 16

Second Semester

- 3 - ENGL 314 Technical Writing
 - 6 - Major³
 - 3 - Minor
 - 3 - Elective
- 15

Senior Year**First Semester**

- 3 - Major³
 - 6 - Minor
 - 3-4 - Technical Elective⁶
 - 4-3 - Elective
- 16

Second Semester

- 6 - Major³
 - 3 - Minor
 - 3-4 - Technical Elective⁶
 - 4-3 - Elective
- 16

128-130 Total Semester Hours

¹German or French is recommended. Two years of the same language are required.

²ENGL 202, 203, 204, 205, 206, 207, 208, 209.

³See General Education Requirements.

⁴Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)

⁵Select from any 300- or 400-level geology courses.

⁶Choose any two courses from AGRON 202, BIOL 103, 104, CE 201, 417, CH 201, CR E 210, EX ST 301, MTHSC 360, PHYS 122, 221 or 207, 208.

MATHEMATICAL SCIENCES**Bachelor of Science**

The Mathematical Sciences curriculum is designed to be versatile. Students obtain a broad knowledge of mathematical concepts and methods that are applicable in sciences, engineering, business, commerce and industry, and other professions for which a strong mathematical background is desired. In addition to containing the basic courses which provide the student with necessary mathematical skills, the curriculum allows the student in his/her junior year to select one of five options, providing an introduction to a specific area where mathematics is applied. These options are Applied Analysis, Biology, Computer Science, Operations Research/Management Science, and Statistics.

In addition to the overall goal of preparing students to cope with a variety of mathematical problems, the curriculum seeks to provide an adequate background for the student who plans to pursue graduate study or one of the interesting positions in business, industry or government. Those students electing the Biology option will have the necessary preparation for entering medical school.

Freshman Year**First Semester**

- 3 - ECON 200 Economic Concepts or
 - 3 - ECON 211 Principles of Microeconomics
 - 3 - ENGL 101 Composition I
 - 3 - HIST 172 or 173 Western Civilization
 - 4 - MTHSC 106 Calculus of One Variable I
 - 4 - Foreign Language Requirement¹
- 17

Second Semester

- 3 - CP SC 110 Elem. Computer Programming
 - 3 - ENGL 102 Composition II
 - 4 - MTHSC 108 Calculus of One Variable II
 - 3 - MTHSC 129 Problem Solving in Discrete Mathematics
 - 4 - Foreign Language Requirement¹
- 17

Sophomore Year**First Semester**

- 1 - MTHSC 206 Calculus of Several Variables
- 4 - MTHSC 250 Intro. to Mathematical Sciences
- 3 - MTHSC 360 Intermediate Math. Computing
- 3 - Literature Requirement²
- 4 - Natural Science Requirement³

15

Second Semester

- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - MTHSC 311 Linear Algebra
- 3 - PHYS 122 Physics with Calculus I
- 3 - Literature Requirement²
- 4 - Natural Science Requirement³

17

Junior Year**First Semester**

- 3 - MTHSC 302 Statistics for Science and Engr.
- 3 - MTHSC 440 Linear Programming
- 4-3 - Approved Requirement⁴
- 3 - Option
- 3-4 - Science Requirement³

16

Second Semester

- 3 - MTHSC 400 Theory of Probability
- 3 - MTHSC 412 Introduction to Modern Algebra
- 4-3 - Approved Requirement⁴
- 3 - Option
- 3-4 - Science Requirement³

16

Senior Year**First Semester**

- 3 - ENGL 314 Technical Writing
- 3 - MTHSC 450 Intro. to Mathematical Models
- 3 - MTHSC 453 Advanced Calculus I *or*
- 3 - MTHSC 463 Mathematical Analysis I
- 3 - SPCH 250 Public Speaking
- 4 - Approved Requirement⁴
- 3 - Option

19

Second Semester

- 3 - MTHSC 454 Advanced Calculus II *or*
- 3 - MTHSC 464 Mathematical Analysis II
- 3 - Option
- 11 - Elective

16

133 Total Semester Hours

OPTIONS**Operations Research/Management Science⁵**

- 3 - IE 482 Systems Modeling *or*
- 3 - IE 384 Engineering Economic Analysis
- 3 - IE 486 Production Planning and Control *or*
- 3 - MGT 402 Operations Planning and Cont.
- 3 - MTHSC 407 Regression and Time-Series Analysis
- 3 - MTHSC 441 Intro. to Stochastic Models
- 3 - MTHSC 460 Intro. to Numerical Analysis I

15

Statistics

- 3 - MA SC 414 Statistical Analysis
- 3 - MTHSC 403 Intro. to Statistical Theory
- 3 - MTHSC 406 Sampling Theory and Methods
- 3 - MTHSC 407 Regression and Time Series Analysis

12

Applied Analysis

- 6 - Applications Area⁶
- Two of the following courses:
- 3 - MTHSC 425 Orthogonal Functions and Boundary Value Problems
- 3 - MTHSC 435 Complex Variables
- 3 - MTHSC 460 Intro. to Numerical Analysis I

12

¹Eight semester hours in the same language are required.²ENGL 202, 203, 204, 205, 206, 207, 208, 209.³Must include two of the following sequences: BIOL 103, 104; CH 101, 102, or 112; ECON 314, 405; PHYS 221/223, 222/224.⁴These requirements must be approved by the advisor.⁵ECON 314, 405.⁶These courses must be approved by the advisor. Possibilities include CH 331, 332; E M 320; MTHSC 457, 458; PHYS 321, 322, 441, 442; M E 302.**Notes:**

1. For graduation, a candidate for the BS degree in Mathematical Sciences will be required to have a 2.0 or higher cumulative grade-point ratio in all required courses taught by the Mathematical Sciences Department including approved mathematical sciences electives and option courses.
2. A grade of C or better must be earned in all prerequisite courses before enrolling in the next MTHSC course.

BIOLOGY OPTION**Freshman Year****First Semester**

- 5 - BIOL 110 Principles of Biology I¹
- 3 - CP SC 110 Elem. Computer Programming
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I

15

Second Semester

- 5 - BIOL 111 Principles of Biology II¹
- 3 - ENGL 102 Composition II
- 3 - MTHSC 108 Calculus of One Variable II
- 3 - MTHSC 129 Problem Solving in Discrete Mathematics

- 1 - MTHSC 250 Intro. to Mathematical Sciences

16

Sophomore Year**First Semester**

- 4 - CH 101 General Chemistry
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - MTHSC 360 Intermediate Math. Computing
- 4 - PHYS 207 General Physics I
- 3 - Literature Requirement²

18

Second Semester

- 4 - CH 112 General Chemistry
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - MTHSC 311 Linear Algebra
- 4 - PHYS 208 General Physics II
- 3 - Literature Requirement²

18

Junior Year**First Semester**

- 3 - CH 223 Organic Chemistry
- 1 - CH 227 Organic Chemistry Lab.
- 3 - MTHSC 302 Statistics for Science and Engr.
- 3 - MTHSC 440 Linear Programming
- 4 - Foreign Language³
- 2 - Elective

16

Second Semester

- 3 - CH 224 Organic Chemistry
- 1 - CH 228 Organic Chemistry Lab.
- 3 - MTHSC 400 Theory of Probability
- 3 - MTHSC 412 Introduction to Modern Algebra
- 4 - Foreign Language³
- 2 - Elective

16

Senior Year**First Semester**

- 3 - ECON 200 Economic Concepts *or*
- 3 - ECON 211 Principles of Microeconomics
- 3 - MTHSC 450 Intro. to Mathematical Models
- 3 - MTHSC 453 Advanced Calculus I *or*
- 3 - MTHSC 463 Mathematical Analysis I
- 4 - Animal or Plant Diversity Requirement⁴
- 3 - Elective

16

Second Semester

- 3 - HIST 172 or 173 Western Civilization
- 3 - MTHSC 454 Advanced Calculus II *or*
- 3 - MTHSC 464 Mathematical Analysis II
- 3 - SPCH 250 Public Speaking
- 3 - ENGL 314 Technical Writing
- 4-3 - Biological Science Requirement⁵
- 2-3 - Elective

18

133 Total Semester Hours

¹Those qualifying for advanced placement in languages or wanting to take languages the freshman year may take them in place of these courses.²ENGL 202, 203, 204, 205, 206, 207, 208, 209.³In the same language.⁴BIOS 302, 303, 304, 305.⁵Select from BIOCH 301, GEN 302, MICRO 305 or any 300- and 400-level biological science or zoology course.**Notes:**

1. For graduation, a candidate for the BS degree in Mathematical Sciences will be required to have a 2.0 or higher cumulative grade-point ratio in all required courses taught by the Mathematical Sciences Department including approved mathematical sciences electives and option courses.
2. A grade of C or better must be earned in all prerequisite courses before enrolling in the next MTHSC course.

COMPUTER SCIENCE OPTION**Freshman Year****First Semester**

- 3 - ECON 200 Economic Concepts *or*
- 3 - ECON 211 Principles of Microeconomics
- 3 - ENGL 101 Composition I
- 3 - HIST 172 or 173 Western Civilization
- 4 - MTHSC 106 Calculus of One Variable I
- 4 - Foreign Language¹

17

Second Semester

- 3 - CP SC 110 Elem. Computer Programming
- 3 - ENGL 102 Composition II
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - MTHSC 129 Problem Solving in Discrete Mathematics
- 4 - Foreign Language¹

17

Sophomore Year**First Semester**

- 4 - CP SC 210 Programming Methodology
- 4 - MTHSC 206 Calculus of Several Variables
- 1 - MTHSC 250 Intro. to Mathematical Sciences
- 3 - Literature Requirement²
- 4 - Science Requirement³

16

Second Semester

- 3 - CP SC 240 Introduction to Data Structures
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - MTHSC 311 Linear Algebra
- 3 - Literature Requirement²
- 4 - Science Requirement³

17

Junior Year**First Semester**

- 3 - MTHSC 302 Statistics for Science and Engr.
- 3 - MTHSC 360 Intermediate Math. Computing
- 3 - MTHSC 440 Linear Programming
- 3 - PHYS 122 Physics with Calculus I
- 3-4 - Science Requirement³

15-16

Second Semester

- 3 - ENGL 314 Technical Writing
- 3 - SPCH 250 Public Speaking
- 3 - MTHSC 400 Theory of Probability
- 3 - MTHSC 412 Introduction to Modern Algebra
- 4-3 - Computer Science Requirement⁴
- 3-4 - Science Requirement³

19

Senior Year**First Semester**

- 3 - MTHSC 450 Intro. to Mathematical Models
- 3 - MTHSC 453 Advanced Calculus I or
- 3 - MTHSC 463 Mathematical Analysis I
- 3 - MTHSC 460 Intro. to Numerical Analysis I
- 7-9 - Approved Requirement³

16-18

Second Semester

- 3 - MTHSC 454 Advanced Calculus II or
- 3 - MTHSC 464 Mathematical Analysis II
- 3 - Computer Science Requirement⁴
- 10 - Elective

16

133 Total Semester Hours

¹Eight semester hours in the same language are required.²ENGL 202, 203, 204, 205, 206, 207, 208, 209.³Must include two of the following sequences: BIOL 103, 104; CH 101, 102 or 112; ECON 314, 405; PHYS 221/223, 222/224.⁴Choose one of the following sequences: CP SC 231, 428; 350, 450; 360, 462 or any two courses from CP SC 331, 350, 360, 372 or MTHSC 461.⁵Must be approved by the advisor.**Notes:**

1. For graduation, a candidate for the BS degree in Mathematical Sciences will be required to have a 2.0 or higher cumulative grade-point ratio in all required courses taught by the Mathematical Sciences Department including approved mathematical sciences electives and option courses.

2. A grade of C or better must be earned in all prerequisite courses before enrolling in the next MTHSC course.

MATHEMATICAL SCIENCES

Bachelor of Arts**Freshman Year****First Semester**

- 3 - ECON 200 Economic Concepts or
- 3 - ECON 211 Principles of Microeconomics
- 3 - ENGL 101 Composition I
- 3 - HIST 172 Western Civilization
- 4 - MTHSC 106 Calculus of One Variable I
- 4 - Foreign Language Requirement¹

17

Second Semester

- 3 - CP SC 110 Elem. Computer Programming
- 3 - ENGL 102 Composition II
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - MTHSC 129 Problem Solving in Discrete Mathematics
- 4 - Foreign Language Requirement¹

17

Sophomore Year**First Semester**

- 4 - MTHSC 206 Calculus of Several Variables
- 1 - MTHSC 250 Intro. to Mathematical Sciences
- 3 - Foreign Language Requirement¹
- 3 - Literature Requirement²
- 4 - Natural Science Requirement³

15

Second Semester

- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - MTHSC 311 Linear Algebra
- 3 - Foreign Language Requirement¹
- 3 - Literature Requirement²
- 4 - Natural Science Requirement³

17

Junior Year**First Semester**

- 3 - A A H 210 Intro. to Art and Architecture or
- 3 - MUSIC 210 Music Appreciation: Music in the Western World
- 3 - SPCH 250 Public Speaking
- 3 - MTHSC 302 Statistics for Science and Engr.
- 3 - Minor
- 3 - Social Science Requirement³
- 2 - Elective

17

Second Semester

- 3 - HIST 173 Western Civilization
- 3 - MTHSC 400 Theory of Probability
- 3 - MTHSC 412 Introduction to Modern Algebra
- 3 - Minor
- 3 - Social Science Requirement³
- 2 - Elective

17

Senior Year**First Semester**

- 3 - MTHSC 440 Linear Programming or
- 3 - MTHSC 450 Intro. to Math. Models
- 3 - MTHSC 453 Advanced Calculus I or
- 3 - MTHSC 463 Mathematical Analysis I
- 6 - Minor
- 3 - Elective

15

Second Semester

- 3 - ENGL 314 Technical Writing
- 3 - MTHSC 454 Advanced Calculus II or
- 3 - MTHSC 464 Mathematical Analysis II
- 3 - Humanities Requirement³
- 3 - Mathematical Sciences Requirement⁴
- 3 - Minor
- 3 - Elective

18

133 Total Semester Hours

¹Four semesters of the same language.²ENGL 202, 203, 204, 205, 206, 207, 208, 209.³Must be approved by advisor.⁴Select from 300- and 400-level MTHSC courses with approval of advisor.**Notes:**

1. For graduation, a candidate for the BA degree in Mathematical Sciences will be required to have a 2.0 or higher cumulative grade-point ratio in all required courses taught by the Mathematical Sciences Department including approved mathematical sciences electives and option courses.

2. A grade of C or better must be earned in all prerequisite courses before enrolling in the next MTHSC course.

PHYSICS**Bachelor of Science**

Physics, the most fundamental of the natural sciences, forms the basis upon which the study of other branches of science is founded. Physics is concerned with the fundamental behavior of matter and energy. Classical physics encompasses the fields of mechanics, heat and thermodynamics, electricity and magnetism, acoustics and optics. Modern physics is concerned with the study of atoms and molecules, atomic nuclei, elementary particles and the properties of liquids, crystalline solids, and other materials, as well as the areas of relativity, cosmology, and the large-scale structure of the universe.

The undergraduate Physics curricula are designed to provide students with a strong background in the classical areas of physics as well as an introduction into the more important aspects of modern physics. The BS in Physics curriculum is directed toward preparing students for graduate study ultimately leading to the PhD degree or toward research and development work in industrial or governmental laboratories. It also provides a good background for graduate study or industrial work in many areas of engineering and applied science.

Freshman Year**First Semester**

- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I
- 1 - PHYS 101 Current Topics in Modern Physics
- 3 - Social Science Requirement¹

15

Second Semester

- 4 - CH 102 General Chemistry
- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I
- 1 - PHYS 124 Physics Lab. I

18

Sophomore Year**First Semester**

- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 1 - PHYS 223 Physics Lab. II
- 4 - Foreign Language Requirement²
- 3 - Literature Requirement³

15

Second Semester

- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - PHYS 222 Physics with Calculus III
- 1 - PHYS 224 Physics Lab. III
- 4 - Foreign Language Requirement²
- 3 - Humanities Requirement¹

3 - Elective

18

Junior Year**First Semester**

- 3 - PHYS 311 Intro. to Meth. of Theoretical Phys.
- 3 - PHYS 321 Mechanics I
- 3 - PHYS 325 Experimental Physics I
- 3 - Concentration Area⁴
- 3 - Written Communications Requirement¹

15

Second Semester

- 3 - PHYS 322 Mechanics II
- 3 - PHYS 326 Experimental Physics II
- 3 - PHYS 355 Modern Physics
- 3 - PHYS 441 Electromagnetics I
- 3 - Concentration Area⁴

3 - Elective

18

Senior Year**First Semester**

- 3 - PHYS 401 Senior Thesis I
- 3 - PHYS 442 Electromagnetics II
- 3 - PHYS 455 Quantum Physics I
- 3 - Concentration Area⁴
- 3 - Social Science Requirement¹

15

Second Semester

- 3 - PHYS 465 Thermodynamics and Statistical Mechanics
- 3 - Concentration Area⁴
- 3 - Oral Communication Requirement¹
- 3 - Science Requirement³
- 4 - Elective

16

130 Total Semester Hours

¹See General Education Requirements. Social Science requirement must include either HIST 172 or 173.

²Two semesters in same modern foreign language.

³ENGL 202, 203, 204, 205, 206, 207, 208, 209.

⁴The Area of Concentration may be chosen from the following: Chemistry, Computer Science, Engineering, Environmental Science, Geology, Mathematical Science, and Physics and Astronomy. The student will take a total of 12 credits in one of these areas, at least six of which will normally be at the 300-400 level. It should be noted that the requirements for a minor in one of these areas might be satisfied with three additional credits at the 300-400 level.

⁵The Science requirement will be fulfilled by courses in the disciplines listed in (4) above at the 300-400 level in a discipline other than that chosen for the Concentration Area.

BIOPHYSICS OPTION

The Physics-Biophysics Option offers an excellent preparation for medical school or graduate work in biological sciences. It includes the flexibility of selecting courses in chemistry, biological sciences, physics, and mathematics. This option also provides the necessary background for employment in industry, manufacturing and instrumentation for clinical or molecular biology applications.

Freshman Year**First Semester**

- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I
- 1 - PHYS 101 Current Topics in Modern Physics
- 3 - Social Science Requirement¹

15

Second Semester

- 4 - CH 102 General Chemistry
- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I
- 1 - PHYS 124 Physics Lab. I

18

Sophomore Year**First Semester**

- 5 - BIOL 110 Principles of Biology I
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 1 - PHYS 223 Physics Lab. II
- 3 - Literature Requirement²

16

Second Semester

- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - PHYS 222 Physics with Calculus III
- 1 - PHYS 224 Physics Lab. III
- 4 - Biophysics Requirement¹
- 3 - Humanities Requirement¹
- 3 - Elective

18

Junior Year**First Semester**

- 3 - PHYS 311 Intro. to Meth. of Theoretical Phys.
- 3 - PHYS 321 Mechanics I
- 3 - PHYS 325 Experimental Physics I
- 3 - Biophysics Requirement³
- 4 - Foreign Language Requirement⁴

16

Second Semester

- 3 - PHYS 322 Mechanics II
- 3 - PHYS 355 Modern Physics

- 3 - PHYS 441 Electromagnetics I
- 3 - Biophysics Requirement³
- 4 - Foreign Language Requirement⁴

16

Senior Year**First Semester**

- 3 - PHYS 442 Electromagnetics II
- 3 - PHYS 455 Quantum Physics I
- 3 - Biophysics Requirement³
- 3 - Writing Intensive Requirement¹
- 3 - Elective

15

Second Semester

- 3 - PHYS 465 Thermodynamics and Statistical Mechanics³
- 3 - Biophysics Requirement³
- 3 - Oral Communication Requirement¹
- 3 - Social Science Requirement¹
- 4 - Elective

16

130 Total Semester Hours

¹See General Education Requirements.

²ENGL 202, 203, 204, 205, 206, 207, 208, 209.

³Select from an approved course list from offerings in physics, chemistry, mathematics, and the biological sciences. At least six credits must be in the biological sciences.

⁴Two semesters in the same modern foreign language.

⁵An approved physics course may be substituted for PHYS 465 if the student satisfactorily completes CH 331, 332.

PHYSICS**Bachelor of Arts**

The BA in Physics program is ideal for students interested in acquiring a broad-based liberal education that includes a strong and solid understanding of science.

Freshman Year**First Semester**

- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I
- 1 - PHYS 101 Current Topics in Modern Physics
- 3 - Social Science Requirement¹

15

Second Semester

- 4 - CH 102 General Chemistry
- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I
- 1 - PHYS 124 Physics Lab. I

18

Sophomore Year**First Semester**

- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 1 - PHYS 223 Physics Lab. II
- 4 - Foreign Language Requirement²
- 3 - Literature Requirement³

15

Second Semester

- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - PHYS 222 Physics with Calculus III
- 1 - PHYS 224 Physics Lab. III
- 4 - Foreign Language Requirement²
- 3 - Humanities Requirement¹
- 3 - Elective

18

Junior Year**First Semester**

- 3 - PHYS 311 Intro. to Meth. of Theoretical Phys.
- 3 - PHYS 321 Mechanics I
- 3 - Foreign Language Requirement²
- 3 - Minor
- 3 - Writing Intensive Requirement¹

15

Second Semester

- 3 - PHYS 322 Mechanics II
- 3 - PHYS 355 Modern Physics
- 3 - PHYS 441 Electromagnetics I
- 3 - Foreign Language Requirement²
- 3 - Minor

15

Senior Year**First Semester**

- 3 - PHYS 325 Experimental Physics I
- 6 - Minor
- 3 - Physics (as approved)
- 3 - Social Science Requirement¹
- 3 - Elective

18

Second Semester

- 3 - Minor
- 3 - Oral Communication Requirement¹
- 3 - Physics (as approved)
- 3 - Social Science Requirement¹
- 4 - Elective

16

130 Total Semester Hours

¹See General Education Requirements. Social Science Requirement must include either HIST 172 or 173.

²Four semesters in the same modern foreign language.

³ENGL 202, 203, 204, 205, 206, 207, 208, 209.

TEXTILE PROGRAMS

The textile student studies the production of natural and man-made fibers, the processes for converting these fibers into a textile structure, the science of coloring agents and finishes to improve the desirability and serviceability of the product, and the methods for evaluating the performance of textile materials.

Graduates of the School of Textiles, Fiber and Polymer Science hold jobs in corporate management, manufacturing management, design, research, development, technical service, quality control, sales and personnel management. They create new products and processes and solve problems. They create styles, patterns, textures and colors for apparel, home and industrial use as well as special application. They deal with computers, automation, product quality, plant performance, environmental control and consumer safety.

The textile industry has a continuing need for technically trained men and women to help meet sociologically desirable standards such as those required by the Occupational Safety and Health Act, the Consumer Product Safety Commission and the Environmental Protection Agency. In addition, there is a need to reduce costs and increase exports and to develop new fibers and fabrics for end-use, ranging from apparel and new industrial applications to fiber reinforced composite materials. In the textile curricula a broad background is stressed, with as much as two-thirds of the courses coming from the diverse resources of the University outside the School of Textiles, Fiber and Polymer Science.

The School of Textiles offers three undergraduate degrees which differ in the content of science and business courses. The BS in Textile Chemistry and the BS in Textile Science are based on chemistry, physics and mathematics. With this firm base, the graduate is able to apply his/her scientific knowledge to the solution of problems in textile materials involving both chemical and physical principles. The graduate will be concerned with the conception, design, construction and management of complete systems of labor, machinery and processes for the most efficient production of textiles or related chemicals. These two courses differ in that Textile Chemistry has a greater emphasis on chemistry, and Textile Science has greater emphasis on yarn and fabric formation. Both curricula prepare one for graduate study in textiles.

The Bachelor of Science in Textile Management provides the student with a balanced combination of the principles and theories of textile manufacturing and management, as well as concentrated studies in related options of the student's choice. This program is designed to prepare students for careers in the modern industrial environment and may initially lead to a production management position in the textile industry.

The textile graduate must be able to meet the current and anticipated needs of the rapidly changing textile industry; he/she must also be knowledgeable about the suppliers and users of textile materials and equipment. This plan of study maximizes the student's leadership potential and professional development in the chosen field.

The School of Textiles, Fiber and Polymer Science also offers advanced degrees as follows: Master of Science in Textile Chemistry, Master of Science in Textile Science, Doctor of Philosophy in Textile and Polymer Science, and in cooperation with the Chemistry Department, the Doctor of Philosophy in Chemistry with a major in Textile Chemistry.

Textile courses also may be taken as a minor area or as free electives. Recommended groups of courses may consist of 3, 6, 12, or 20 credits.

Note: No curriculum in the School of Textiles, Fiber and Polymer Science leading to the Bachelor of Science degree will allow credit for ENGL 100 or MTHSC 105 to be used to satisfy requirements for graduation.

TEXTILE CHEMISTRY**Bachelor of Science****Freshman Year****First Semester**

- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - TEXT 175 Intro. to Textile Manufacturing
- 3 - History Requirement¹

17

Second Semester

- 4 - CH 102 General Chemistry
- 3 - CP SC 110 Elem. Computer Programming or
3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I

17

Sophomore Year**First Semester**

- 3 - CH 223 Organic Chemistry
- 2 - CH 225 Organic Chemistry Lab.
- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 1 - PHYS 223 Physics Lab. II
- 3 - Literature Requirement²

16

Second Semester

- 3 - CH 224 Organic Chemistry
- 2 - CH 226 Organic Chemistry Lab.
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - PHYS 222 Physics with Calculus III
- 1 - PHYS 224 Physics Lab. III
- 3 - Humanities Requirement³

16

Junior Year**First Semester**

- 3 - CH 331 Physical Chemistry
- 3 - ECON 200 Economic Concepts
- 3 - T C 315 Intro. to Polymer Science and Engr.
- 1 - T C 317 Polymer and Fiber Lab.
- 4 - TEXT 201 Yarn Structure and Form
- 3 - Elective

17

Second Semester

- 3 - CH 332 Physical Chemistry
- 3 - ENGL 314 Technical Writing
- 3 - T C 316 Chemical Preparation of Textiles
- 4 - TEXT 202 Fabric Struc., Design, and Analysis
- 4 - Elective

17

Senior Year**First Semester**

- 3 - T C 457 Dyeing and Finishing I
- 1 - T C 459 Dyeing and Finishing Lab. I
- 3 - TEXT 321 Fiber Science
- 9 - Elective

16

Second Semester

- 3 - T C 458 Dyeing and Finishing II
- 1 - T C 460 Dyeing and Finishing Lab. II
- 3 - TEXT 322 Properties of Textile Structures
- 3 - SPCH 250 Public Speaking *or*
- 3 - SPCH 251 Business and Prof. Speaking
- 6 - Elective
- 16

132 Total Semester Hours

¹HIST 101, 102, 172, 173.²ENGL 202, 203, 204, 205, 206, 207, 208, 209.³See General Education Requirements.**TEXTILE MANAGEMENT****Bachelor of Science****Freshman Year****First Semester**

- 4 - CH 101 General Chemistry *or*
- 4 - CH 105 Beg. Gen. and Organic Chemistry
- 3 - ENGL 101 Composition I
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 3 - TEXT 175 Intro. to Textile Manufacturing
- 3 - History Requirement¹
- 16

Second Semester

- 4 - CH 102 General Chemistry *or*
- 4 - CH 106 Beg. Gen. and Organic Chemistry
- 3 - CP SC 110 Elem. Computer Programming *or*
- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 3 - MTHSC 207 Multivariable Calculus
- 4 - TEXT 176 Natural and Manmade Fibers
- 17

Sophomore Year**First Semester**

- 3 - ACCT 201 Accounting Concepts I
- 3 - ECON 200 Economic Concepts
- 3 - PSYCH 201 Introduction to Psychology
- 4 - TEXT 201 Yarn Structures and Form
- 3 - Humanities Requirement²
- 16

Second Semester

- 3 - ACCT 202 Accounting Concepts II
- 3 - MGT 301 Principles of Management
- 3 - SPCH 250 Public Speaking *or*
- 3 - SPCH 251 Business and Prof. Speaking
- 4 - TEXT 202 Fabric Struc., Design, and Analysis
- 3 - Literature Requirement³
- 16

Junior Year**First Semester**

- 3 - FIN 306 Corporation Finance
- 3 - LAW 322 Legal Environment of Business
- 3 - MKT 301 Principles of Marketing
- 3 - Area of Study⁴
- 4 - Special Interest Area⁵
- 16

Second Semester

- 3 - ENGL 314 Technical Writing
- 3 - MGT 307 Personnel Management
- 3 - Area of Study⁴
- 7 - Special Interest Area⁵
- 16

Senior Year**First Semester**

- 3 - TEXT 324 Textile Statistics
- 3 - TEXT 470 Text. Cost. and Inventory Control
- 3 - Area of Study⁴
- 6-7 - Special Interest Area⁵
- 3 - Elective
- 18-19

Second Semester

- 3 - MGT 415 Business Strategy
- 3 - Area of Study⁴
- 3-4 - Special Interest Area⁵
- 7 - Elective
- 17-16

132 Total Semester Hours

¹HIST 101, 102, 172, or 173.²See General Education Requirements.³ENGL 202, 203, 204, 205, 206, 207, 208, or 209.⁴Area of Study—A minimum of 12 credits must be selected with at least nine credits from any one of the following:*Personnel*—ECON 301, 308, LAW 312, 313, 401, MGT 400, 416.*Markets and Marketing*—ECON 314, 412, MKT 302, 423, 424, 426, 431, 450, TEXT 472.*Industrial Engineering*—E G 209, I E 488, 489, MGT 402, 408.*Product Development and Merchandising*—TEXT 333, 472, 475, MKT 302, 423, 425.*Science*—T C 303/305, 304/306, MTHSC 106, 108, 206, 208, PHYS 122, 221, 222, 223, 224.*Computer Science*—CP SC 130, 210, 240, 330, 360, 462, MGT 299, 399, TEXT 420.*Textile Specialties*—TEXT 321, 414, 416, 471, 475, 476.*Note:* Credit toward graduation will not be granted for both MTHSC 102/207 and 106/206.⁵Special Interest Area—For either Interest Area, Chemical or Manufacturing, the listed 21 hours are required:*Chemical*—T C 303/305, 304/306, 316, 405, 406, 457/459.*Manufacturing*—TEXT 308, 314, 322, 403, 411, 426, 429.**TEXTILE SCIENCE****Bachelor of Science****Freshman Year****First Semester**

- 4 - CH 101 General Chemistry
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I
- 3 - TEXT 175 Intro. to Textile Manufacturing
- 3 - History Requirement¹
- 17

Second Semester

- 4 - CH 102 General Chemistry
- 3 - CP SC 110 Elem. Computer Programming *or*
- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 4 - MTHSC 108 Calculus of One Variable II
- 3 - PHYS 122 Physics with Calculus I
- 17

Sophomore Year**First Semester**

- 4 - MTHSC 206 Calculus of Several Variables
- 3 - PHYS 221 Physics with Calculus II
- 1 - PHYS 223 Physics Lab. II
- 3 - TEXT 301 Fiber Processing I
- 3 - Literature Requirement²
- 1 - Elective
- 15

Second Semester

- 3 - ECON 200 Economic Concepts
- 4 - MTHSC 208 Intro. to Ord. Diff. Equations
- 3 - PHYS 222 Physics with Calculus III
- 1 - PHYS 224 Physics Lab. III
- 3 - TEXT 302 Fiber Processing II
- 3 - Elective
- 17

Junior Year**First Semester**

- 3 - T C 303 Textile Chemistry
- 1 - T C 305 Textile Chemistry Lab.
- 3 - TEXT 311 Fabric Development I
- 3 - TEXT 321 Fiber Science
- 5 - Approved Requirement³
- 3 - Humanities Requirement⁴
- 18

Second Semester

- 3 - ENGL 314 Technical Writing
- 3 - T C 304 Textile Chemistry
- 1 - T C 306 Textile Chemistry Lab.
- 3 - TEXT 312 Fabric Development II
- 3 - TEXT 322 Properties of Textile Structures
- 3 - Elective
- 16

Senior Year**First Semester**

- 3 - T C 315 Intro. to Polymer Science and Eng.
- 1 - T C 317 Polymer and Fiber Lab.
- 3 - T C 457 Dyeing and Finishing I
- 1 - T C 459 Dyeing and Finishing Lab. I
- 3 - TEXT 403 Fiber Processing III
- 3 - TEXT 411 Fabric Development III
- 3 - Approved Requirement³
- 17

Second Semester

- 3 - TEXT 414 Knitted Structures
- 3 - SPCH 250 Public Speaking *or*
- 3 - SPCH 251 Business and Prof. Speaking
- 9 - Elective
- 15

132 Total Semester Hours

¹HIST 101, 102, 172, 173.²ENGL 202, 203, 204, 205, 206, 207, 208, 209.³See advisor for list of approved requirements.⁴See General Education Requirements.

COLLEGE OF HEALTH, EDUCATION AND HUMAN DEVELOPMENT

The College of Health, Education and Human Development oversees the academic programs offered by the School of Nursing, the Department of Public Health, and the Department of Parks, Recreation and Tourism Management. The college also oversees the departments in the field of education which include Counseling and Educational Leadership, Curriculum and Instruction, Foundations and Special Education, and Technology and Human Resource Development, as well as the National Dropout Prevention Center, and the Joseph F. Sullivan Center for Nursing and Wellness.

The preparation of professional leaders in the areas of health, education, nursing, recreation, park management, and tourism services is the primary focus of the College of Health, Education and Human Development. The educational resources of Clemson's other colleges are integrated into these curricular areas. This provides each student with the breadth as well as the depth to be a successful professional within the field chosen.

TEACHER EDUCATION PROGRAMS

The purpose of the Teacher Education Program is to prepare teachers, to provide professional services to education in South Carolina, and to carry out basic and applied research in education. Curricula are organized to give students the opportunity to acquire a broad general education through liberal arts and science courses, develop depth of knowledge in the teaching area, gain an understanding of the historical, philosophical and psychological backgrounds of American education, and acquire knowledge of and skill and experience in using effective teaching techniques.

The Teacher Education Programs are nationally accredited for the preparation of educational personnel in South Carolina in Early Childhood Education (K-4), Elementary Education (grades 1-8), Special Education (K-12), and the following secondary school programs (grades 9-12): agriculture, technology education, biological sciences, physical sciences, earth science, mathematics, English, modern languages, history and geography, political science and economics, and psychology and sociology.

Admission

Professional Application to the professional level of a program must be made during the term in which a student is to complete 60 semester hours of work. The professional education admission application is to be submitted to the appropriate office during the term in which the student will have completed 60 hours. Application deadline dates for submission are as follows:

Fall Semester—November 10;
Spring Semester—March 1; and Summer Session—June 15. Prerequisites for admission are (1) successful completion of the Basic Skills Education Entrance Examination (EEE)¹, and (2) a minimum cumulative grade-point ratio of 2.5 or a minimum cumulative grade-point ratio of 2.0 and evidence of a SAT score above the 50th percentile of South Carolina examinees in the year the applicant graduated from high school.

Directed Teaching A student shall apply to the field experience director prior to May 1 of the academic year preceding the school year in which directed teaching is to be scheduled. The following conditions must be met prior to registration for directed teaching: (1) admission to the professional level of a program for at least one full semester; (2) completion of at least 95 semester hours; (3) a minimum cumulative grade-point ratio of 2.0; and (4) a score report on file in the student records office for the Professional Knowledge Examination of the NTE Core Battery and for the NTE Specialty Area Examination in the student's major.

¹A student who has not passed the EEE may be conditionally admitted to a teacher education program for a period not to exceed one year. Students will be allowed to take the examination no more than three times. Students who fail to meet the EEE requirement within one year of the date of conditional admission will be dropped from the program and assigned to a nondegree status classification.

Continuing Enrollment

A student must maintain the grade-point ratio required by Clemson University for continuing enrollment. Grade-point ratio may be checked at the end of a semester or summer term.

Enrollment in Professional Courses

Students enrolled in an approved teacher education program or listed with a major code of 300, 301, or 315 must have a cumulative grade-point ratio of 2.0 or higher for registration in required education, technology and human resource development or agricultural education courses numbered 300 or higher. Any student who desires to enroll in education courses must meet the cumulative grade-point requirements established for education majors. A student who is denied admission may appeal to the Education Admissions Committee.

A comprehensive statement of the activities, services, and programs in education is published in the *Education Handbook*, which is distributed by class instructors to students enrolled in ED 100 and by faculty advisors of education majors and students interested in programs provided in Education.

Graduate Study

Programs leading to the Master of Education, Master of Human Resource Development, Master of Industrial Education, Specialist in Education, Doctor of Education, and Doctor of Philosophy degrees are offered.

AGRICULTURAL EDUCATION

Bachelor of Science

The College of Health, Education and Human Development and the College of Agriculture, Forestry and Life Sciences conduct a cooperative program to produce agricultural teachers (grades 9-12) for South Carolina. (See the Agricultural Education curriculum under the College of Agriculture, Forestry and Life Sciences.)

EARLY CHILDHOOD EDUCATION

Bachelor of Arts

The Early Childhood Education curriculum prepares the student for teaching positions on the kindergarten and primary levels (grades K-4).

Freshman Year

First Semester

- 1 - ED 100 Orientation
- 3 - ENGL 101 Composition I
- 3 - MTHSC 115 Contemporary Mathematics for Elementary School Teachers I
- 4 - PH SC 108 Introduction to Physical Science
- 4 - Foreign Language Requirement¹

15

Second Semester

- 3 - ENGL 102 Composition II
- 3 - HIST 172 Western Civilization
- 3 - MTHSC 116 Contemporary Mathematics for Elementary School Teachers II
- 4 - PH SC 107 Introduction to Earth Science
- 4 - Foreign Language Requirement¹

17

Sophomore Year

First Semester

- 4 - BIOL 109 Introduction to Life Science
- 3 - HIST 173 Western Civilization
- 3 - Arts and Humanities Requirement²
- 3 - Foreign Language Requirement¹
- 3 - Literature Requirement³

16

Second Semester

- 3 - ED F 301 Principles of American Education
- 3 - ED F 334 Child Growth and Development
- 3 - Arts and Humanities Requirement²
- 3 - Computer Skills Requirement⁴
- 3 - Foreign Language Requirement¹

3 - Elective

18

Junior Year

First Semester

- 3 - ED F 302 Educational Psychology
- 3 - ED SP 402 The Exceptional Child
- 3 - ENGL 385 Children's Literature
- 3 - THRD 310 Arts and Creativity for the Elementary Child
- 3 - SPCH 150 Intro. to Speech Communication or
- 3 - SPCH 250 Public Speaking

3 - Elective

18

Second Semester

- 3 - ED 466 Intro. to Early Childhood Education
- 1 - ED F (THRD) 315 Integrating Computers into the Classroom
- 3 - ED F 336 Behavior of the Preschool Child¹
- 3 - ED F 458 Health Education
- 3 - GEOG 101 Introduction to Geography *or*
- 3 - GEOG 103 World Regional Geography
- 4 - Elective

17

Senior Year*(Courses must be taken as listed in both semesters)***First Semester**

- 3 - ED 321 Physical Education for Elementary School: Games and Sports Skills
- 1 - ED 400 Early Childhood Field Experience
- 1 - ED 459 Teach. Read. in the Early Grades: K-3
- 3 - ED 483 Methods and Materials for Early Childhood Education
- 3 - ED 488 Teaching the Language Arts in the Elementary School

13

Second Semester

- 12 - ED 484 Directed Teaching in Early Childhood Education
- 3 - Writing Intensive Requirement⁴

15

129 Total Semester Hours

¹Two years of the same foreign language are required.²A total of six credits selected from the following: A H 210; HUM 301 and 302; MUSIC 210 or 311 or 400; THEA 210³ENGL 202, 203, 204, 205, 206, 207, 208, 209.⁴Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)⁵To be taken prior to or in the same semester as ED 466.⁶Choose from courses designated W.3. See advisor.**ELEMENTARY EDUCATION****Bachelor of Arts**

The Elementary Education curriculum prepares the student for teaching on the elementary school level (grades 1-8).

Freshman Year**First Semester**

- 1 - ED 100 Orientation
- 3 - ENGL 101 Composition I
- 3 - MTHSC 115 Contemporary Mathematics for Elementary School Teachers I
- 4 - PH SC 108 Introduction to Physical Science
- 4 - Foreign Language Requirement¹

15

Second Semester

- 3 - ENGL 102 Composition II
- 3 - HIST 172 Western Civilization
- 3 - MTHSC 116 Contemporary Mathematics for Elementary School Teachers II
- 4 - PH SC 107 Introduction to Earth Science
- 4 - Foreign Language Requirement¹

17

Sophomore Year**First Semester**

- 4 - BIOL 109 Introduction to Life Science
- 3 - HIST 173 Western Civilization
- 3 - MTHSC 216 Geom. for Elem. School Teachers
- 3 - Arts and Humanities Requirement²
- 3 - Foreign Language Requirement¹
- 3 - Literature Requirement³

19

Second Semester

- 3 - ED F 334 Child Growth and Development
- 3 - GEOG 101 Introduction to Geography *or*
- 3 - GEOG 103 World Regional Geography
- 3 - SPCH 150 Intro. to Speech Comm. *or*
- 3 - SPCH 250 Public Speaking
- 3 - Arts and Humanities Requirement²
- 3 - Computer Skills Requirement⁴
- 3 - Foreign Language Requirement¹

18

Junior Year**First Semester**

- 3 - ED 321 Physical Education for Elementary School: Games and Sports Skills
- 3 - ED F 301 Principles of American Education
- 3 - ED F 302 Educational Psychology
- 3 - ED F 458 Health Education
- 3 - ENGL 385 Children's Literature
- 4 - Elective

19

Second Semester

- 3 - ED 452 Elem. Methods in Math. Teaching
- 3 - ED 459 Teach. Read. in the Early Grades: K-3
- 1 - ED F (THRD) 315 Integrating Computers into the Classroom
- 3 - ED SP 402 The Exceptional Child
- 3 - THRD 310 Arts and Creativity for the Elementary Child
- 6 - Elective

19

Senior Year*(Courses must be taken as listed in both semesters)***First Semester**

- 1 - ED 401 Elementary Field Experience
- 3 - ED 451 Elem. Methods in Science Teaching
- 3 - ED 460 Teach. Read. in the Inter. Grades 4-8
- 3 - ED 487 Teach. Soc. Studies in the Elem. Sch.
- 3 - ED 488 Teaching the Language Arts in the Elementary School

13

Second Semester

- 12 - ED 481 Directed Teach. in the Elem. School
- 3 - Writing Intensive Requirement⁵

15

135 Total Semester Hours

¹Two years of the same foreign language are required.²A total of six credits selected from the following: A H 210; HUM 301 and 302; MUSIC 210 or 311 or 400; THEA 210³ENGL 202, 203, 204, 205, 206, 207, 208, 209.⁴Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)⁵Choose from courses designated W.3. See advisor.**INDUSTRIAL EDUCATION****Bachelor of Science**

The Bachelor of Science degree in Industrial Education is designed to prepare students for professional teaching positions, as well as occupations within the framework of human resource development/industrial training in the private sector. To accomplish these purposes the curriculum is divided into the three areas of specialization. By the end of the freshman year, each student is required to select one of the three options: Human Resource Development, Industrial Technology Education, or Vocational-Technical Education. Each option requires 135 semester hours of coursework.

HUMAN RESOURCE DEVELOPMENT OPTION

The Human Resource Development option is designed to prepare students to enter industry or business as training and development specialists. The curriculum provides participants with a broad exposure to industrial processes in the areas of manufacturing, construction, power/transportation, and communications. Numerous hands-on experiences related to the application of technology in industry are integrated with valuable skills and knowledge from the training and development profession. Students will exit the program with skills related to analyzing needs; conducting job and task analyses; designing, marketing, and evaluating training programs; delivering professional presentations; and developing instructional materials.

Freshman Year**First Semester**

- 3 - ENGL 101 Composition I
- 3 - THRD 110 Intro. to Industrial Technology
- 3 - THRD 180 Introduction to Technical Drawing and Computer Aided Drafting
- 3 - Mathematics Requirement¹
- 4 - Science Requirement²

16

Second Semester

- 3 - ENGL 102 Composition II
- 3 - THRD 160 Training Programs in Industry
- 3 - THRD 181 Advanced Technical Drawing and Computer-Aided Drafting
- 3 - Mathematics Requirement¹
- 4 - Science Requirement²

16

Sophomore Year**First Semester**

- 3 - ACCT 200 Basic Accounting *or*
- 3 - ACCT 201 Accounting Concepts I
- 3 - CP SC 120 Issues in Computers
- 3 - THRD 200 Manufacturing Tech. I: Systems
- 3 - THRD 230 Construction Tech. I: Materials
- 3 - Literature Requirement³

15

Second Semester

- 3 - ECON 200 Economic Concepts *or*
- 3 - ECON 211 Principles of Microeconomics
- 3 - PSYCH 201 Introduction to Psychology
- 3 - SPCH 250 Public Speaking *or*
- 3 - SPCH 251 Business and Prof. Speaking

- 3 - THRD 240 Power Technology I: Production
- 3 - THRD 280 Comm. Tech. I: Processes and Mat.
- 1 - Elective

16

Junior Year

First Semester

- 3 - ECON 301 Economics of Labor *or*
- 3 - ECON 308 Collective Bargaining
- 3 - MGT 301 Principles of Management
- 3 - THRD 484 Comm. Tech. II: Systems
- 3 - Humanities Requirement⁴
- 3 - Major Requirement⁵
- 3 - Elective

18

Second Semester

- 3 - ENGL 314 Technical Writing
- 3 - MGT 307 Personnel Management
- 3 - THRD 360 Ind. Organizations and Safety
- 3 - THRD 430 Const. Tech. II: Practices and Syst.
- 3 - Major Requirement⁵
- 3 - Elective

18

Senior Year

First Semester

- 3 - THRD 440 Power Technology II: Transmission and Control Systems
- 3 - THRD 460 Dev. Training Programs for Ind.
- 3 - THRD 468 Public Relations
- 3 - Communication Requirement⁶
- 3 - Major Requirement⁵
- 3 - Elective

18

Second Semester

- 3 - MGT 416 Mgt. of Human Resources *or*
- 3 - MGT 400 Mgt. of Organizational Behavior *or*
- 3 - PSYCH 368 Organizational Psychology
- 3 - PSYCH 364 Industrial Psychology *or*
- 3 - PSYCH 454 Psychology of Human Relationships *or*
- 3 - PRTM 308 Leadership and Group Processes in Recreation
- 3 - THRD 420 Manuf. Tech. II: Mat. and Proc.
- 3 - THRD 465 Conducting and Evaluating Training Programs for Industry
- 3 - THRD 486 Instructional Media Development
- 3 - Major Requirement⁵

18

135 Total Semester Hours

¹See General Education Requirements.²An eight-credit sequence of biological or physical science, each including laboratories.³ENGL 202, 203, 204, 205, 206, 207, 208, 209.⁴Select from HUM 305, PHIL 324, 344, SPCH 365.⁵Major Requirement to be approved by advisor; two technical courses must be represented.⁶Select from ENGL 304, SPCH 340, 350, 360, 361, 364.*Note:* One summer (400 clock hours) of field experience is required of each student following the sophomore year.

INDUSTRIAL TECHNOLOGY EDUCATION OPTION

The Industrial Technology Education option is for students who desire to teach industrial technology in the secondary schools (grades 9–12). Industrial technology is the subject area in the public school system which attempts to provide youth with an interpretation of American industry. It is a general education subject designed to give students exploratory experience in the classroom and laboratory. Majors in this option are qualified to seek certification as secondary school teachers of industrial technology, prevocational, and industrial arts education.

Freshman Year

First Semester

- 1 - ED 100 Orientation
- 3 - ENGL 101 Composition I
- 3 - THRD 110 Intro. to Industrial Technology
- 3 - Mathematics Requirement¹
- 4 - Science Requirement²
- 2 - Elective

16

Second Semester

- 3 - ENGL 102 Composition II
- 3 - THRD 180 Introduction to Technical Drawing and Computer-Aided Drafting
- 3 - Computer Skills Requirement¹
- 3 - Mathematics Requirement¹
- 4 - Science Requirement²
- 2 - Elective

18

Sophomore Year

First Semester

- 3 - HIST 173 Western Civilization
- 3 - THRD 220 Manuf. Tech. I: Systems
- 3 - THRD 230 Construction Tech. I: Materials
- 3 - Literature Requirement¹
- 4 - Science Requirement²
- 1 - Elective

17

Second Semester

- 3 - MUSIC 210 Music Appreciation: Music in the Western World
- 3 - SPCH 250 Public Speaking
- 3 - THRD 181 Advanced Technical Drawing and Computer-Aided Drafting
- 3 - THRD 240 Power Technology I: Production
- 3 - THRD 280 Comm. Tech. I: Processes and Mat.
- 3 - Social Science Requirement¹

18

Junior Year

First Semester

- 3 - ED F 302 Educational Psychology
- 3 - ED F 458 Health Education
- 3 - THRD 440 Power Technology II
- 3 - THRD 484 Comm. Tech. II: Systems
- 3 - Writing Intensive Requirement¹
- 2 - Elective

17

Second Semester

- 3 - AA H 210 Intro. to Art and Architecture
- 3 - ED F 335 Adolescent Growth and Dev.
- 3 - THRD 415 History and Philosophy of Industrial and Vocational Education *or*
- 3 - ED F 301 Prin. of American Education
- 3 - THRD 420 Manuf. Tech. II: Mat. and Proc.
- 3 - THRD 430 Const. Tech. II: Practices and Syst.
- 3 - Major Requirement⁴

18

Senior Year

First Semester

- 3 - ED SP 402 The Exceptional Child
- 3 - THRD 470 Course Organization and Eval.
- 3 - THRD 471 Teaching Industrial Subjects
- 3 - Major Requirement⁴
- 4 - Elective

16

Second Semester

- 3 - THRD 371 Mgt. of Industrial Education Labs.
- 12 - THRD 477 Directed Teaching

15

135 Total Semester Hours

¹See General Education Requirements.²Both biological and physical laboratory sciences must be represented with an eight-credit sequence in one.³Select from ENGL 202, 203, 204, 205, 206, 207, 208, 209.⁴To be selected from THRD 222, 224, 250, 281, 320, 441, 450, 480, 482, 483, 484, G C 207, 215, TEXT 333, 460.

VOCATIONAL-TECHNICAL EDUCATION OPTION

The Vocational-Technical Education option is designed to prepare teachers of vocational and technical subjects in the senior high schools, area vocational centers, and technical education centers. All elective courses in this option will be in an area of specialization or related fields. Teachers graduating from this option will possess the skills and knowledge required to teach the occupation or family of occupations in their area of specialization.

Freshman Year

First Semester

- 3 - ENGL 101 Composition I
- 3 - Mathematics Requirement¹
- 4 - Science Requirement¹
- 3 - Technical Specialty Requirement²
- 3 - Elective

16

Second Semester

- 3 - ENGL 102 Composition II
- 3 - Mathematics Requirement¹
- 4 - Science Requirement¹
- 3 - Technical Specialty Requirement²
- 3 - Elective

16

Sophomore Year

First Semester

- 3 - Literature Requirement¹
- 3 - Social Science Requirement¹
- 6 - Technical Specialty Requirement²
- 4 - Elective

16

Second Semester

- 3 - Computer Skills Requirement¹
- 3 - Humanities Requirement¹
- 3 - Social Science Requirement¹
- 6 - Technical Specialty Requirement²

15

Summer

- 6 - THRD 390 Industrial Cooperative Experience I

Junior Year**First Semester**

- 3 - SPCH 250 Public Speaking
- 3 - THRD 370 Motivation and Discipline in Vocational Education
- 3 - Approved Requirement³
- 6 - Technical Specialty Requirement²

15

Second Semester

- 3 - THRD 371 Mgt. of Industrial Education Labs.
- 3 - Approved Requirement³
- 6 - Technical Specialty Requirement²
- 3 - Writing Intensive Requirement¹

15

Summer

- 6 - THRD 490 Industrial Cooperative Experience II

Senior Year**First Semester**

- 3 - THRD 470 Course Organization and Eval.
- 3 - THRD 471 Teaching Industrial Subjects
- 3 - THRD 472 Advanced Instructional Methods
- 6 - THRD 478 Internship in Voc. Tech. Ed. I

15

Second Semester

- 3 - THRD 415 History and Philosophy of Industrial and Vocational Education *or*
- 3 - ED F 301 Prin. of American Education
- 3 - THRD 473 Competency Test. in Voc. Subjects
- 6 - THRD 479 Internship in Voc. Technical Ed. II
- 3 - THRD 480 Educational Applications of Microcomputers

15

135 Total Semester Hours

¹See General Education Requirements.²Technical specialties must relate to one of the Trades and Industries programs recognized by the South Carolina Department of Education. See advisor for list of approved specialties and list of courses available to meet the Technical Specialty Requirement.³Approved Requirements must be approved by advisor.**MATHEMATICS TEACHING****Bachelor of Science**

The program leading to a Bachelor of Science degree in Mathematics Teaching is designed for students planning to teach mathematics on the secondary school level (grades 9–12).

Freshman Year**First Semester**

- 4 - BIOL 103 General Biology I
- 4 - CH 105 Beg. General and Organic Chemistry
- 1 - ED 100 Orientation
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I

2 - Elective

18

Second Semester

- 4 - BIOL 104 General Biology II
- 4 - CH 106 Beg. Gen. and Organic Chemistry *or*
- 4 - CH 112 General Chemistry
- 3 - ENGL 102 Composition II
- 4 - MTHSC 108 Calculus of One Variable II

3 - Elective

18

Sophomore Year**First Semester**

- 3 - CP SC 120 Issues in Computers
- 3 - HIST 172 Western Civilization
- 4 - MTHSC 206 Calculus of Several Variables
- 4 - PHYS 207 General Physics I
- 3 - Literature Requirement¹

17

Second Semester

- 3 - CP SC 110 Elem. Computer Programming
- 3 - ED F 302 Educational Psychology
- 3 - HIST 173 Western Civilization
- 3 - HUM 301 or 302 Humanities²
- 4 - PHYS 208 General Physics II

2 - Elective

18

Junior Year**First Semester**

- 3 - ED F 301 Principles of American Education
- 3 - MTHSC 301 Statistical Theory and Methods I
- 3 - MTHSC 308 College Geometry
- 3 - Mathematics Requirement³
- 3 - Social Science Requirement⁴

3 - Elective

18

Second Semester

- 3 - ED 426 Teaching Secondary Mathematics³
- 3 - ED 498 Secondary Content Area Reading³
- 1 - ED F 315 Integrating Computers into the Classroom
- 3 - MTHSC 311 Linear Algebra
- 3 - MTHSC 408 Topics in Geometry
- 3 - Social Science Requirement⁴

16

Senior Year*(Directed Teaching— Either Semester)***First Semester**

- 3 - ED F 335 Adolescent Growth and Dev.
- 3 - ENGL 314 Technical Writing
- 3 - MTHSC 412 Introduction to Modern Algebra
- 3 - MTHSC 453 Advanced Calculus I
- 3 - SPCH 150 Intro. to Speech Communication *or*
- 3 - SPCH 250 Public Speaking

3 - Mathematics Requirement³

18

Second Semester

- 12 - ED 412 Directed Teaching
- 3 - ED SP 402 The Exceptional Child

15

138 Total Semester Hours

¹ENGL 202, 203, 204, 205, 206, 207, 208, 209.²This requirement may also be satisfied by completing A H 210 and MUSIC 210 or 311. In this case, the additional three credits will be recorded as elective hours.³Any 200-400 level mathematics course, except MTHSC 207, 210, 215, 216.⁴Economics (including AP EC 202) geography, political science, psychology, sociology.⁵To be taken the semester prior to Directed Teaching.**SCIENCE TEACHING****Bachelor of Science**

The program leading to a Bachelor of Science degree in Science Teaching is designed for students planning to teach biological sciences, chemistry, earth science, or physical sciences on the secondary school level (grades 9–12). The required science electives are included to give some degree of competency in a field other than the major area. Students are urged to discuss the NTE with their advisor upon completion of the sophomore year.

TEACHING AREA: BIOLOGICAL SCIENCES**Freshman Year****First Semester**

- 4 - CH 101 General Chemistry
- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 101 Composition I
- 3 - HIST 172 Western Civilization
- 4 - MTHSC 106 Calculus of One Variable I

17

Second Semester

- 4 - CH 102 General Chemistry
- 1 - ED 100 Orientation
- 3 - ENGL 102 Composition II
- 3 - HIST 173 Western Civilization
- 3 - MTHSC 301 Stat. Theory and Methods I *or*
- 4 - MTHSC 108 Calculus of One Variable II

3 - Elective

17-18

Sophomore Year**First Semester**

- 5 - BIOL 110 Principles of Biology I
- 4 - CH 201 Survey of Organic Chemistry *or*
- 3 - CH 330 Introduction to Physical Chemistry
- 3 - ED F 301 Principles of American Education
- 1 - ED F 315 Integrating Computers into the Classroom
- 4 - PHYS 207 General Physics I

16-17

Second Semester

- 5 - BIOL 111 Principles of Biology II
- 3 - ED F 302 Educational Psychology
- 4 - PHYS 208 General Physics II
- 3 - SPCH 150 Intro. to Speech Communication *or*
- 3 - SPCH 250 Public Speaking
- 3 - Literature Requirement¹

18

Junior Year**First Semester**

- 3 - BIOCH 210 Elementary Biochemistry *and*
- 1 - BIOCH 211 Elementary Biochemistry Lab. *or*
- 3 - BIOCH 301 General Biochemistry *and*
- 1 - BIOCH 302 Molecular Biology Lab.
- 2 - BIOSC 222 Human Anatomy and Phys. I
- 2 - BIOSC 224 Human Anatomy and Phys. Lab. I
- 3 - ED F 335 Adolescent Growth and Dev.
- 4 - GEN 302 Genetics

- 3 - Elective

18

Second Semester

- 2 - BIOSC 223 Human Anatomy and Physiology II
- 2 - BIOSC 225 Human Anatomy and Phys. Lab. II
- 3 - ENGL 314 Technical Writing
- 3 - HUM 301 or 302 Humanities
- 4 - Plant Diversity Requirement²
- 3 - Social Science Requirement³

17

Senior Year*(Directed Teaching—Either Semester)***First Semester**

- 3 - ED 427 Teaching Secondary Science⁴
- 3 - ED 498 Secondary Content Area Reading⁴
- 4 - Animal Diversity Requirement⁵
- 3 - Social Science Requirement²
- 4 - Elective

17

Second Semester

- 12 - ED 412 Directed Teaching
- 3 - ED SP 402 The Exceptional Child

15

135-137 Total Semester Hours

¹ENGL 202, 203, 204, 205, 206, 208, 209.²BIOSC 304/308 or 305/309.³Anthropology, economics, geography, political science, psychology, sociology.⁴To be taken semester immediately prior to student teaching.⁵BIOSC 302/306 or 303/307.

Note: This curriculum leads to South Carolina certification to teach all science subjects in grades 7-12 and provides special expertise for teaching middle school life science and senior high school biological sciences.

TEACHING AREA:**EARTH SCIENCE****Freshman Year****First Semester**

- 4 - BIOL 103 General Biology I
- 4 - CH 101 General Chemistry
- 1 - ED 100 Orientation
- 3 - ENGL 101 Composition I
- 4 - MTHSC 106 Calculus of One Variable I

16

Second Semester

- 4 - BIOL 104 General Biology II
- 4 - CH 102 General Chemistry
- 3 - CP SC 120 Issues in Computers
- 3 - ENGL 102 Composition II
- 3 - MTHSC 301 Stat. Theory and Methods I

17

Sophomore Year**First Semester**

- 3 - ED F 301 Principles of American Education
- 3 - GEOL 101 Physical Geology
- 1 - GEOL 103 Physical Geology Lab.
- 3 - HIST 172 Western Civilization
- 4 - PHYS 207 General Physics I
- 3 - Literature Requirement¹

17

Second Semester

- 3 - ED F 302 Educational Psychology
- 4 - GEOL 102 Historical Geology
- 3 - HIST 173 Western Civilization
- 4 - PHYS 208 General Physics II
- 3 - SPCH 150 Intro. to Speech Communication *or*
- 3 - SPCH 250 Public Speaking

17

Junior Year**First Semester**

- 3 - ASTR 101 Solar System Astronomy
- 3 - ED F 335 Adolescent Growth and Dev.
- 4 - GEOL 306 Mineralogy
- 3 - HUM 301 or 302 Humanities
- 3 - Social Science Requirement²
- 1 - Elective

17

Second Semester

- 1 - ED F 315 Integrating Computers into the Classroom
- 3 - ENGL 314 Technical Writing
- 3 - GEOL 400 Environmental Geology *or*
- 3 - GEOL 405 Geomorphology
- 3 - PHYS 240 Physics of the Weather
- 3 - Social Science Requirement²
- 3 - Elective

16

Senior Year*(Directed Teaching—Either Semester)***First Semester**

- 3 - ASTR 102 Stellar Astronomy
- 3 - ED 427 Teaching Secondary Science³
- 3 - ED 498 Secondary Content Area Reading³

- 4 - GEOL 302 Structural Geology *or*
- 3 - GEOL 403 Invertebrate Paleontology
- 6 - Elective
- 18-19

Second Semester

- 12 - ED 412 Directed Teaching
- 3 - ED SP 402 The Exceptional Child

15

133-134 Total Semester Hours

¹ENGL 202, 203, 204, 205, 206, 207, 208, 209.²Anthropology, economics (including APEC 202), geography, political science, psychology, sociology.³To be taken semester immediately prior to student teaching.

Note: This curriculum leads to South Carolina certification to teach all science subjects in grades 7-12 and provides special expertise for teaching middle and secondary earth and environmental sciences.

TEACHING AREA:**PHYSICAL SCIENCES****Freshman Year****First Semester**

- 4 - CH 101 General Chemistry
- 1 - ED 100 Orientation
- 3 - ENGL 101 Composition I
- 3 - HIST 172 Western Civilization
- 4 - MTHSC 106 Calculus of One Variable I

15

Second Semester

- 4 - CH 102 General Chemistry
- 2 - CH 205 Introduction to Inorganic Chemistry
- 3 - ENGL 102 Composition II
- 3 - HIST 173 Western Civilization
- 4 - MTHSC 108 Calculus of One Variable II

16

Sophomore Year**First Semester**

- 4 - BIOL 103 General Biology I
- 4 - CH 201 Survey of Organic Chemistry
- 3 - CP SC 120 Issues in Computers
- 3 - ED F 301 Principles of American Education
- 3 - MTHSC 301 Statistical Theory and Methods I

17

Second Semester

- 4 - BIOL 104 General Biology II
- 3 - ED F 302 Educational Psychology
- 3 - PHYS 122 Physics with Calculus I
- 1 - PHYS 124 Physics Lab. I
- 3 - SPCH 150 Intro. to Speech Communication *or*
- 3 - SPCH 250 Public Speaking
- 3 - Elective

17

Junior Year**First Semester**

- 3 - ED F 335 Adolescent Growth and Dev.
- 3 - HUM 301 or 302 Humanities
- 3 - PHYS 221 Physics with Calculus II
- 1 - PHYS 223 Physics Lab. II
- 3-4 - Astronomy Requirement¹
- 3 - Social Science Requirement²

16-17

Second Semester

- 1 - ED F 315 Integrating Computers into the Classroom
- 3 - ENGL 314 Technical Writing
- 3 - PHYS 222 Physics with Calculus III
- 1 - PHYS 224 Physics Lab. III
- 3 - PHYS 240 Physics of the Weather
- 3 - Literature Requirement³
- 3 - Elective

17

Senior Year*(Directed Teaching—Either Semester)***First Semester**

- 3 - ED 427 Teaching Secondary Science⁴
- 3 - ED 498 Secondary Content Area Reading⁴
- 3-4 - Physical Sciences Requirement⁵
- 3 - Social Science Requirement²
- 4 - Elective

16-17

Second Semester

- 12 - ED 412 Directed Teaching
- 3 - ED SP 402 The Exceptional Child

15

129-131 Total Semester Hours¹ASTR 101/103 (four credits) or ASTR 220 (three credits).²Anthropology, economics, geography, political science, psychology, sociology.³ENGL 202, 203, 204, 205, 206, 207, 208, 209.⁴To be taken semester immediately prior to student teaching.⁵ASTR 302, ASTR 303, CH 330, CH 413, GEOL 306, or PHYS 446, or 452.

Note: This curriculum leads to South Carolina certification to teach all science subjects in grades 7-12 and provides special expertise for teaching secondary school chemistry, physics, and physical sciences.

SECONDARY EDUCATION**Bachelor of Arts**

Programs leading to a Bachelor of Arts degree in Secondary Education are available to students preparing to teach English, history, mathematics, French, German, Spanish, political science, and social science on the secondary school level (grades 9-12). The teaching field should be selected as early as possible in order that appropriate freshman and sophomore courses may be taken.

Each curriculum requires a major concentration in the teaching field. Specific courses and sequences have been designated by teacher education committees to meet requirements for those planning to teach. Students who have elective courses in the teaching area should consult the departmental advisor prior to scheduling these courses.

The professional education courses should be completed in sequence prior to registering for the block schedule. Application to Directed Teaching (ED 412) should be made in writing no later than May 1 preceding the school year in which student teaching is to be scheduled. A student whose cumulative grade-point ratio is lower than the requirement for graduation will not be permitted to register for Directed Teaching.

Education 412 is conducted on a full-day basis, "block schedule," for one semester.

TEACHING AREA: ENGLISH**Freshman Year****First Semester**

- 3 - ENGL 101 Composition I
- 3 - MTHSC 101 Introduction to Probability
- 3 - Computer Skills Requirement¹
- 4 - Foreign Language Requirement²
- 4 - Science Requirement³

17

Second Semester

- 1 - ED 100 Orientation
- 3 - ENGL 102 Composition II
- 3 - HIST 172 Western Civilization
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 4 - Foreign Language Requirement²
- 4 - Science Requirement³

18

Sophomore Year**First Semester**

- 3 - ED F 301 Principles of American Education
- 3 - ENGL 202 Major Forms of Literature
- 3 - HIST 173 Western Civilization
- 3 - SPCH 150 Intro. to Speech Communication or 3 - SPCH 250 Public Speaking
- 3 - Foreign Language Requirement²
- 3 - Social Science Requirement⁴

18

Second Semester

- 3 - ED F 302 Educational Psychology
- 3 - ENGL 209 Contemporary Literature
- 3 - ENGL 353 Ethnic American Literature
- 3 - Foreign Language Requirement²
- 3 - Social Science Requirement⁴
- 3 - Elective

18

Junior Year**First Semester**

- 3 - ED F 315 Integrating Computers into the Classroom
- 3 - ED F 335 Adolescent Growth and Dev.
- 3 - HIST 365 English Cultural History
- 3 - HUM 301 or 302 Humanities⁵
- 6 - Teaching Major⁶

18

Second Semester

- 3 - ED 424 Teaching Secondary English⁷
- 3 - ED 498 Secondary Content Area Reading⁷
- 9 - Teaching Major⁶
- 3 - Elective

18

Senior Year*(Directed Teaching—Either Semester)***First Semester**

- 3 - ED SP 402 The Exceptional Child
- 9 - Teaching Major⁶
- 4 - Elective

16

Second Semester

- 12 - ED 412 Directed Teaching

12

135 Total Semester Hours

¹Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)

²Two years of the same language are required.

³A total of eight semester hours in a two-semester sequence, including appropriate laboratories, are required.

⁴Anthropology, economics, (including AP EC 202), geography, political science, psychology or sociology.

⁵This requirement may also be satisfied by completing A H 210 and MUSIC 210 or 311. In this case, the additional three credit hours will be recorded as electives.

⁶In addition to ENGL 209 and 353, the Teaching Major requires 24 credits of junior and senior English courses and must include ENGL 386; 400; 401; 405 or 406; 411; 422, 423, 424 or 425; 435; 485.

⁷To be taken in the semester preceding Directed Teaching.

TEACHING AREA: HISTORY AND GEOGRAPHY**Freshman Year****First Semester**

- 1 - ED 100 Orientation
- 3 - ENGL 101 Composition I
- 3 - MTHSC 101 Introduction to Probability
- 4 - Foreign Language Requirement¹
- 4 - Science Requirement²

2 - Elective

17

Second Semester

- 3 - ENGL 102 Composition II
- 3 - HIST 172 Western Civilization
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 4 - Foreign Language Requirement¹
- 4 - Science Requirement²

17

Sophomore Year**First Semester**

- 3 - HIST 173 Western Civilization
- 3 - SOC 201 Introduction to Sociology
- 3 - Computer Skills Requirement¹
- 3 - Foreign Language Requirement¹
- 3 - Geography Requirement⁴
- 3 - Literature Requirement⁵

18

Second Semester

- 3 - ED F 301 Principles of American Education
- 3 - HIST 101 History of the United States
- 3 - Foreign Language Requirement¹
- 3 - Writing Intensive Requirement⁶

6 - Elective

18

Junior Year**First Semester**

- 3 - ED F 302 Educational Psychology
- 3 - ED F 335 Adolescent Growth and Dev.
- 3 - HIST 102 History of the United States
- 9 - Teaching Major⁷

18

Second Semester

- 3 - ED 428 Teaching Secondary Social Studies⁸
- 3 - ED 498 Secondary Content Area Reading⁸
- 1 - ED F 315 Integrating Computers into the Classroom
- 3 - SPCH 150 Intro. to Speech Communication or 3 - SPCH 250 Public Speaking

6 - Teaching Major⁷

2 - Elective

18

Senior Year*(Directed Teaching—Either Semester)***First Semester**

3 - ECON 200 Economics Concepts

3 - HUM 301 or 302 Humanities⁹

3 - PO SC 101 Intro. to American Politics

9 - Teaching Major⁷

18

Second Semester

12 - ED 412 Directed Teaching

3 - ED SP 402 The Exceptional Child

15

139 Total Semester Hours

⁷Two years of the same language are required.⁹A two-semester sequence in the same natural science, including laboratories, is required.⁹Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)⁹GEOG 101, 103, or 220.⁹ENGL 202, 203, 204, 205, 206, 207, 208, 209.⁹Choose from among courses designated as W.3. See advisor.

The Teaching Major consists of 24 semester hours of junior and senior (300 and 400) level courses composed of 18 semester hours from history and six semester hours from geography. Courses must be selected with the consent of the major advisor and include at least three hours in each of the following categories: United States history or geography, European history or geography, Third World or non-European history or geography. At least six hours must be at the 400 level, including HIST 490. HIST 313 is recommended for those planning to teach in South Carolina.

⁷To be taken in the semester preceding Directed Teaching.

⁹This requirement may also be satisfied by completing A A H 210 and MUSIC 210 or 311. In this case, the additional three credit hours will be recorded as electives.

TEACHING AREA:**MATHEMATICS****Freshman Year****First Semester**

4 - BIOL 103 General Biology I

1 - ED 100 Orientation

3 - ENGL 101 Composition I

4 - MTHSC 106 Calculus of One Variable I

4 - Foreign Language Requirement¹

16

Second Semester

4 - BIOL 104 General Biology II

3 - ENGL 102 Composition II

4 - MTHSC 108 Calculus of One Variable II

4 - Foreign Language Requirement¹

3 - Elective

18

Sophomore Year**First Semester**

3 - CP SC 120 Issues in Computers

4 - MTHSC 206 Calculus of Several Variables

3 - Foreign Language Requirement¹3 - Literature Requirement²3 - Science Requirement¹

2 - Elective

18

Second Semester

3 - CP SC 110 Elem. Computer Programming

3 - ED F 302 Educational Psychology

3 - HIST 172 Western Civilization

3 - Foreign Language Requirement¹3 - Science Requirement¹3 - Social Science Requirement¹

18

Junior Year**First Semester**

3 - ED F 301 Principles of American Education

1 - ED F 315 Integrating Computers into the Classroom

3 - HIST 173 Western Civilization

3 - MTHSC 301 Statistical Theory and Methods I

3 - MTHSC 308 College Geometry

3 - Social Science Requirement¹

2 - Elective

18

Second Semester3 - ED 426 Teaching Secondary Mathematics⁵3 - ED 498 Secondary Content Area Reading³3 - HUM 301 or 302 Humanities⁶

3 - MTHSC 311 Linear Algebra

3 - MTHSC 408 Topics in Geometry

3 - Elective

18

Senior Year*(Directed Teaching—Either Semester)***First Semester**

3 - ED F 335 Adolescent Growth and Dev.

3 - ENGL 314 Technical Writing

3 - MTHSC 412 Introduction to Modern Algebra

3 - MTHSC 453 Advanced Calculus I

3 - SPCH 150 Intro. to Speech Communication or

3 - SPCH 250 Public Speaking

3 - Mathematics Requirement⁷

18

Second Semester

12 - ED 412 Directed Teaching

3 - ED SP 402 The Exceptional Child

15

139 Total Semester Hours

⁷Two years of the same language are required.⁹ENGL 202, 203, 204, 205, 206, 207, 208, 209.⁹Astronomy, chemistry, geology, physics.⁹Economics (including AP EC 202), geography, political science, psychology, sociology.⁹To be taken in the semester preceding Directed Teaching.

⁹This requirement may also be satisfied by completing A A H 210 and MUSIC 210 or 311. In this case, the additional three credit hours will be recorded as elective hours.

⁹Any 200-400 level mathematics course, except MTHSC 207, 210, 215, 216.

TEACHING AREA: MODERN LANGUAGES

(French, German, and Spanish)

Freshman Year**First Semester**

1 - ED 100 Orientation

3 - ENGL 101 Composition I

3 - MTHSC 101 Introduction to Probability

4 - Foreign Language Requirement¹4 - Science Requirement²

15

Second Semester

3 - ENGL 102 Composition II

3 - HIST 172 Western Civilization

3 - MTHSC 102 Intro. to Mathematical Analysis

4 - Foreign Language Requirement¹4 - Science Requirement²

17

Sophomore Year**First Semester**

3 - ED F 301 Principles of American Education

3 - HIST 173 Western Civilization

3 - Computer Skills Requirement¹3 - Foreign Language Requirement¹3 - Literature Requirement¹

15

Second Semester

3 - ED F 302 Educational Psychology

3 - Foreign Language Requirement¹3 - Literature Requirement¹3 - Social Science Requirement¹

6 - Elective

18

Junior Year**First Semester**

3 - ED F 335 Adolescent Growth and Dev.

3 - Social Science Requirement¹9 - Teaching Major⁸

3 - Elective

18

Second Semester

1 - ED F 315 Integrating Computers into the Classroom

3 - SPCH 150 Intro. to Speech Communication or

3 - SPCH 250 Public Speaking

9 - Teaching Major⁸

3 - Elective

16

Senior Year*(Directed Teaching—Either Semester)***First Semester**3 - ED 425 Teach. Secondary Modern Languages⁹3 - ED 498 Secondary Content Area Reading⁷3 - HUM 301 or 302 Humanities⁸6 - Teaching Major⁸3 - Writing Intensive Requirement⁹

18

Second Semester

- 12 - ED 412 Directed Teaching
- 3 - ED SP 402 The Exceptional Child

15

132 Total Semester Hours

*Two years of the same language are required.

²A two-semester sequence in the same natural science, including laboratories, is required.

³Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)

*ENGL 202, 203, 204, 205, 206, 207, 208, 209.

⁴Economics (including APEC 202), political science, psychology, sociology, geography, anthropology.

*The Teaching Major requires 24 credits in French, German, or Spanish as listed.

French Major must include FR 409, and 21 credits arranged as follows:

Group I—FR 300, 305, 307, 309.

Group II—Nine credits at the 400 level, including at least one 400-level literature course.

German Major must include GER 305, 411, and 18 credits arranged as follows:

Group I—12 credits from GER 301, 302, 308, 316, 412 or 416.

Group II—Six credits from GER 401, 402, 403, 413.

Spanish Major must include 24 credits arranged as follows:

Group I—SPAN 303 or 304 and 311 (preferably in sequence).

Group II—Nine credits from SPAN 305, 307, 308.

Group III—SPAN 401 and 409.

Group IV—Three credits from 300-400 level courses.

⁷To be taken the semester prior to Directed Teaching.

*This requirement may also be satisfied by completing A H 210 and MUSIC 210 or 311. In this case, the additional three credits will be recorded as electives.

⁸Choose from courses designated as W/3. See advisor.

TEACHING AREA: POLITICAL SCIENCE AND ECONOMICS

Freshman Year

First Semester

- 1 - ED 100 Orientation
- 3 - ENGL 101 Composition I
- 3 - HIST 172 Western Civilization
- 3 - MTHSC 101 Introduction to Probability
- 4 - Foreign Language Requirement¹
- 4 - Science Requirement²

18

Second Semester

- 3 - ENGL 102 Composition II
- 3 - HIST 173 Western Civilization
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 4 - Foreign Language Requirement¹
- 4 - Science Requirement²

17

Sophomore Year

First Semester

- 3 - HIST 101 History of the United States
- 3 - SOC 201 Introduction to Sociology
- 3 - Computer Skills Requirement³
- 3 - Foreign Language Requirement¹
- 3 - Literature Requirement⁴
- 2 - Elective

17

Second Semester

- 3 - ECON 200 Economic Concepts⁵
- 3 - ED F 301 Principles of American Education
- 3 - HIST 102 History of the United States
- 3 - PO SC 101 Introduction to American Politics
- 3 - Foreign Language Requirement¹
- 3 - Elective

18

Junior Year

First Semester

- 3 - ED F 302 Educational Psychology
- 1 - ED F 315 Integrating Computers into the Classroom
- 3 - ED F 335 Adolescent Growth and Dev.
- 2 - Teaching Major⁶
- 2 - Elective

18

Second Semester

- 3 - ED 428 Teaching Secondary Social Studies⁷
- 3 - ED 498 Secondary Content Area Reading⁷
- 3 - SPCH 150 Intro. to Speech Communication or 3 - SPCH 250 Public Speaking
- 2 - Teaching Major⁶

18

Senior Year

(Directed Teaching—Either Semester)

First Semester

- 3 - HUM 301 or 302 Humanities⁸
- 3 - Geography Requirement⁹
- 6 - Teaching Major⁶
- 3 - Writing Intensive Requirement¹⁰
- 3 - Elective

18

Second Semester

- 12 - ED 412 Directed Teaching
- 3 - ED SP 402 The Exceptional Child

15

139 Total Semester Hours

¹Two years of the same language are required.

²A two-semester sequence in the same natural science, including laboratories, is required.

³Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)

*ENGL 202, 203, 204, 205, 206, 207, 208, 209.

⁵Students may take ECON 211/212 in lieu of ECON 200. In that case, the three extra hours are credited as electives.

⁶The Teaching Major consists of 24 semester hours of junior and senior (300 and 400) level courses selected from political science and economics (ECON 301, 302, 309, 310, 404 recommended) with no fewer than nine hours in each of these areas. Political science credits are to be drawn from at least three of the following fields:

American Governments—PO SC 403, 405, 432, 433, 442

Comparative Politics—PO SC 371, 373, 471, 475, 476, 477

International Relations—PO SC 361, 428, 462, 463, 465

Political Theory—PO SC 351, 352, 453

Public Policy and Administration—PO SC 302, 321, 422

⁷To be taken the semester preceding Directed Teaching.

⁸This requirement may also be satisfied by completing A H 210 and MUSIC 210 or 311. In this case, the additional three credit hours will be recorded as electives.

⁹To be selected from GEOG 101, 103, or 220.

¹⁰Choose from courses designated as W/3. See advisor.

TEACHING AREA: PSYCHOLOGY AND SOCIOLOGY

Freshman Year

First Semester

- 1 - ED 100 Orientation
- 3 - ENGL 101 Composition I
- 3 - MTHSC 101 Introduction to Probability
- 4 - Foreign Language Requirement¹
- 4 - Science Requirement²
- 2 - Elective

17

Second Semester

- 3 - ENGL 102 Composition II
- 3 - HIST 172 or 173 Western Civilization
- 3 - MTHSC 102 Intro. to Mathematical Analysis
- 4 - Foreign Language Requirement¹
- 4 - Science Requirement²

17

Sophomore Year

First Semester

- 3 - HIST 101 History of the United States
- 3 - PSYCH 201 Introduction to Psychology
- 3 - Computer Skills Requirement³
- 3 - Foreign Language Requirement¹
- 3 - Geography Requirement⁴
- 3 - Literature Requirement⁵

18

Second Semester

- 1 - ED F 315 Integrating Computers into the Classroom
- 3 - HIST 102 History of the United States
- 3 - PO SC 101 Introduction to American Politics
- 3 - SOC 201 Introduction to Sociology
- 3 - SPCH 150 Intro. to Speech Communication or 3 - SPCH 250 Public Speaking
- 3 - Foreign Language Requirement¹
- 2 - Elective

18

Junior Year

First Semester

- 3 - ED F 301 Principles of American Education
- 3 - ED F 302 Educational Psychology
- 3 - ED F 335 Adolescent Growth and Dev.
- 2 - Teaching Major⁶

18

Second Semester

- 3 - ECON 200 Economic Concepts
- 3 - ED 428 Teaching Secondary Social Studies⁷
- 3 - ED 498 Secondary Content Area Reading⁷
- 3 - Non-Western History Requirement⁸
- 6 - Teaching Major⁶

18

Senior Year

(Directed Teaching—Either Semester)

First Semester

- 3 - HUM 301 or 302 Humanities⁹
- 6 - Teaching Major⁶
- 3 - Writing Intensive Requirement¹⁰
- 6 - Elective

18

Second Semester

- 12 - ED 412 Directed Teaching
 3 - ED SP 402 The Exceptional Child

15

139 Total Semester Hours

¹Two years of the same language are required.

²A two-semester sequence in the same natural science, including laboratories, is required.

³Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)

⁴GEOG 101, 103, or 220.

⁵ENGL 201, 203, 204, 205, 206, 207, 208, 209.

⁶The Teaching Major consists of 21 semester hours of junior and senior (300 and 400) level courses selected from sociology/anthropology and psychology with no fewer than nine hours in each of these two areas. Recommended courses include ANTH 301, 320; PSYCH 320, 330, 333, 340, 352, 370, 415; SOC 311, 392, 397, 460, 461, 481.

⁷To be taken in the semester preceding Directed Teaching.

⁸HIST 330, 333, 338, 339, 340, 341, or 342.

⁹This requirement may also be satisfied by completing A H 210 and MUSIC 210 or 311. In this case, the additional three credit hours will be recorded as electives.

¹⁰Choose from courses designated as W3. See advisor.

SPECIAL EDUCATION**Bachelor of Arts**

The Bachelor of Arts degree in Special Education is designed to prepare students for professional careers working with students with mild to moderate disabilities (grades K-12). The core curriculum assesses the graduate of having the skills and knowledge required for initial employment in the public schools of this state. By using the electives advisedly, students should be able to meet requirements of any state which provides a resource room model providing special services to any students with mild to moderate disabilities, provided the students share similar learning styles. Practical experiences begin with the freshman year and peak with the senior year. These experiences provide opportunities for students to apply their knowledge and skills. The practical experiences culminate in a two-semester senior year field-based training under the mentorship of both school and university supervisors.

Freshman Year**First Semester**

- 1 - ED 100 Orientation
 3 - ENGL 101 Composition I
 3 - MTHSC 115 Contemporary Mathematics for Elementary School Teachers I
 4 - Foreign Language Requirement¹
 4 - Science Requirement²

15

Second Semester

- 3 - ENGL 102 Composition II
 3 - HIST 172 Western Civilization
 3 - MTHSC 116 Contemporary Mathematics for Elementary School Teachers II
 4 - Foreign Language Requirement¹
 4 - Science Requirement²

17

Sophomore Year**First Semester**

- 1 - ED F 315 Integrating Computers into the Classroom
 3 - HIST 173 Western Civilization
 3 - Foreign Language Requirement¹
 3 - Literature Requirement³
 4 - Science Requirement²
 3 - Elective

17

Second Semester

- 3 - GEOG 101 Introduction to Geography
 3 - SPCH 150 Intro. to Speech Communication or
 3 - SPCH 250 Public Speaking
 3 - Computer Skills Requirement⁴
 3 - Foreign Language Requirement¹
 6 - Elective

18

Junior Year**First Semester**

- 3 - ED 459 Teach. Read. in the Early Grades: K-3
 3 - ED F 301 Principles of American Education
 3 - ED F 302 Educational Psychology
 3 - ED F 334 Child Growth and Development
 3 - ED F 458 Health Education
 3 - ED SP 402 The Exceptional Child

18

Second Semester

- 3 - ED 452 Elem. Methods in Math. Teaching
 3 - ED 460 Teach. Read. in the Inter. Grades: 4-8
 3 - ED 488 Teach. Lang. Arts in the Elem. School
 3 - ED F 335 Adolescent Growth and Dev.
 3 - ED SP 371 Char. of the Mildly Handicapped⁵
 3 - Elective

18

Senior Year

(Directed Teaching Must Be Taken as Shown)

First Semester⁶

- 3 - ED SP 491 Assess. of the Mildly Handicapped
 3 - ED SP 492 Academic Skill Intervention for the Handicapped
 3 - ED SP 493 Behavioral Skill Intervention for the Handicapped
 3 - ED SP 494 Teach. Read. to the Except. Child
 3 - ED SP 496 Special Education Field Experience

15

Second Semester

- 12 - ED SP 413 Directed Teaching
 3 - Writing Intensive Requirement⁷

15

133 Total Semester Hours

¹Two years of the same foreign language are required.

²Three science courses (12 semester hours) composed of both biological and physical sciences are required. PH SC 108 and 107 and BIOL 109 are recommended. Eight of these hours must be a two-semester sequence.

³ENGL 202, 203, 204, 205, 206, 207, 208, 209.

⁴Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)

⁵ED SP 371 must be taken as shown during the spring semester of the junior year.

⁶Courses must be taken concurrently fall semester of senior year.

⁷Choose from courses designated W.3. See advisor.

Department of Public Health

The Department of Public Health offers a baccalaureate degree in Health Science that prepares students for careers in health promotion and wellness. Opportunities within the program and elsewhere in the University combine to provide a setting which enables students to fulfill a wide range of educational objectives in the health field.

HEALTH SCIENCE**Bachelor of Science**

The Health Science undergraduate degree program is designed to prepare students for careers which promote health in a variety of settings and with various populations. The Bachelor of Science curriculum consists of four core strands. The first provides students with content and experience in health promotion and education. The second strand addresses health assessment and programming across the life span. Strategies for changing complex health behaviors are the third strand. Communication and research strategies compose the fourth.

The major objectives of the program are to prepare students to implement healthy lifestyles and wellness programs, to coordinate and evaluate health education programs, and to provide health intervention programs. Inherent in these broad objectives are basic health assessment skills necessary to determine health parameters and planning, management and evaluation skills essential to health program development and coordination. The senior year field experiences include opportunities to practice these skills in worksite health promotion programs, health departments, hospital-based wellness programs, day care centers, elementary schools, community coalition programs and radio and television health programs.

The typical curriculum plan is presented below. Preprofessional health studies and Prephysical Therapy students may major in health science as footnoted on the curriculum plan.

Departmental Requirements

All students enrolled in Health Science are required to have proof of Hepatitis B immunization on file in the school's Office of Student Affairs. It is recommended that students begin the three-injection series when admitted into the major. Senior students will need proof of CPR certification prior to beginning senior-level field experiences. Failure to comply with these requirements can result in being dropped from required Health Science courses.

Freshman Year**First Semester**

- 4 - BIOL 103 General Biology I¹
 3 - ENGL 101 Composition I
 3 - HLTH 298 Health Maintenance
 3 - Chemistry Requirement^{1,2}
 4 - Computer Skills Requirement³

17

Second Semester

- 3 - ENGL 102 Composition II
- 3 - PSYCH 201 Introduction to Psychology
- 3 - SOC 201 Introduction to Sociology
- 4 - Chemistry Requirement^{1,2}
- 3 - Mathematical Science Requirement^{1,3}

16

Sophomore Year**First Semester**

- 2 - BIOSC 222 Human Anatomy and Phys. I
- 2 - BIOSC 224 Human Anatomy and Phys. Lab. I
- 3 - EN SP 200 Intro. to Environmental Science^{4,5}
- 3 - HLTH 202 Trends in Health Promotion
- 3 - HLTH 310 Women's Health Issues
- 3 - Writing Intensive Requirement¹

16

Second Semester

- 2 - BIOSC 223 Human Anatomy and Phys. II
- 2 - BIOSC 224 Human Anat. and Phys. Lab. II
- 3 - HLTH 240 Determinants of Health Behavior
- 3 - HLTH 320 Health Maintenance for Men
- 3 - Developmental Psychology Requirement⁶
- 3 - Oral Communication Requirement³

16

Junior Year**First Semester**

- 3 - HLTH 303 Communication in Health Systems
- 3 - HLTH 305 Body Response to Health Behaviors
- 3 - HLTH 340 Health Promotion and Education
- 3 - Humanities Requirement E.1³
- 3 - Mathematical Requirement (Statistics)^{1,7}
- 3 - Elective

18

Second Semester

- 3 - HLTH 380 Epidemiology
- 1 - HLTH 398 Health Maintenance Appraisal⁸
- 3 - SOC 311 The Family^{4,5} or
3 - ANTH 301 Cultural Anthropology^{4,5}
- 3 - Health Requirement^{4,5}
- 3 - Humanities Requirement E.2³
- 3 - Nutrition Requirement⁶
- 3 - Elective

19

Senior Year**First Semester**

- 3 - HLTH 401 Health Consumerism
- 3 - HLTH 410 Concepts of Health for Children
- 3 - HLTH 440 Managing Hlth. Serv. Organizations
- 4 - HLTH 480 Community Health Promotion
- 3 - Elective

16

Second Semester

- 3 - HLTH 402 Principles of Health Fitness
- 3 - HLTH 430 Health Promotion of the Aged
- 4 - HLTH 450 Applied Health Strategies
- 3 - HLTH 490 Research and Evaluation Strategies for Public Health
- 3 - HLTH 498 Contemporary Health Problems
- 1 - Elective

17

135 Total Semester Hours

¹Recommended for preprofessional health students: MTHSC 106, 301; CH 101, 112; BIOL 110, 111.

²CH 101, 102 or 101, 112 or 105, 106.

³See General Education Requirements.

⁴Preprofessional Health students need additional science requirements and may substitute any of the following: four credits of biology, eight credits of physics, eight credits of organic chemistry. (See Health Science advisor.)

⁵Prephysical Therapy students need additional science requirements and may substitute any of the following: four credits of biology, eight credits of physics. (See Health Science advisor.)

⁶See Health Science advisor.

⁷EX ST 301, MTHSC 203, or 301.

⁸May be taken in the fall or spring semester.

NURSING**Bachelor of Science**

The School of Nursing offers a four-year program leading to the Bachelor of Science with a major in Nursing. The program is designed to prepare students for the practice of professional nursing in a variety of settings, such as hospitals, industries, clinics, and public health agencies. This curriculum provides an unlimited opportunity for men and women to attain sound preparation for professional nursing and a foundation for graduate study in science courses arranged sequentially to provide a foundation for the nursing major. In junior and senior years the emphasis is on the study of nursing. Throughout the entire program, however, students are encouraged to enroll in courses outside their major which can be taken simultaneously with the study of nursing. Nursing courses are integrated through all years of the curriculum. Clinical nursing experiences, under the guidance of the School of Nursing faculty, take place with clients in multiple settings, including hospitals, clinics, and other health agencies. These community resources afford students a variety of clinical experiences and assist faculty in providing quality clinical instruction. Students are responsible for their own transportation to all off-campus clinical laboratory experiences.

The RN/BS/MS program is a study option for registered nurses to obtain advanced degrees in nursing. Credits may be earned through an accelerated program of study, combining transfer credits for selected courses from any accredited institution of higher learning, credit by examination for previously completed nursing courses, and enrollment in courses at Clemson University.

All students participating in clinical laboratory assignments are required to carry a valid student nurse's professional liability insurance policy with minimum liability limits of \$1,000,000 per occurrence and \$3,000,000 in aggregate. Documentation is required by the Director of the School of Nursing. No student may participate in clinical learning activities without this insurance coverage.

To comply with clinical agency contract requirements and South Carolina law, students enrolled in nursing courses with a clinical laboratory must meet specific requirements listed in the *School of Nursing Student Handbook*.

Registered nurses interested in pursuing a baccalaureate or master's degree should contact the School of Nursing for curriculum requirements.

Freshman Year**First Semester**

- 4 - BIOL 103 General Biology I
- 3 - ENGL 101 Composition I
- 3 - PSYCH 201 Introduction to Psychology
- 3 - SOC 201 Introduction to Sociology
- 4 - Chemistry Requirement¹

17

Second Semester

- 3 - ENGL 102 Composition II
- 3 - MTHSC 101 Introduction to Probability
- 3 - NUTR 203 Principles of Human Nutrition
- 4 - Chemistry Requirement¹
- 3 - Computer Skills Requirement²

16

Sophomore Year**First Semester**

- 2 - BIOSC 222 Human Anatomy and Phys. I
- 2 - BIOSC 224 Human Anatomy and Phys. Lab. I
- 3 - EX ST 301 Introductory Statistics or
3 - MTHSC 203 Elem. Statistical Inference
- 4 - MICRO 205 Introductory Microbiology
- 3 - NURS 210 Health Assessment
- 3 - NURS 230 Professionalism in Nursing I

17

Second Semester

- 2 - BIOSC 223 Human Anatomy and Phys. II
- 2 - BIOSC 224 Human Anat. and Phys. Lab. II
- 4 - NURS 211 Therapeutic Nursing Interventions
- 3 - NURS 240 Pharmacotherapeutic Nursing Interventions
- 3 - PSYCH 340 Life-Span Developmental Psych.
- 3 - SOC 311 The Family

17

Junior Year**First Semester**

- 4 - NURS 301 Nursing Care of the Childbearing Family
- 4 - NURS 302 Nursing Care of Children
- 3 - NURS 330 Pathophysiology for Health Care Professionals¹
- 4 - NURS 315 The Developing Family in the Community
- 3 - Literature Requirement⁴

18

Second Semester

- 7 - NURS 303 Nursing of Adults
- 4 - NURS 316 Adult Nursing in the Community
- 3 - NURS 402 Long-Term Nursing³
- 3 - Oral Communication Requirement⁴
- 2 - Elective

18

Senior Year**First Semester**

- 4 - NURS 401 Mental Health Nursing
- 3 - NURS 402 Long-Term Nursing Care
- 3 - NURS 415 Community Health Nursing
- 3 - Writing Intensive Requirement⁴
- 4 - Elective

17

Second Semester

- 6 - NURS 403 Complex Nursing of Adults
- 6 - NURS 405 Leadership and Management in the Delivery of Nursing Care
- 3 - Humanities Requirement¹
- 4 - Elective

17

137 Total Semester Hours

¹Select from CH 105 and 106 or 101 and 102/112. (See advisor.)

²Must be approved by advisor.

³NURS 304 to be taken with the junior year first-semester nursing courses.

⁴See General Education Requirements.

Notes:

1. A minimum of C is required in the following science courses for progression to junior year clinical courses: BIOL 103, BIOSC 222/224 and 223/225, MICRO 205 and the Chemistry Requirement.
2. A minimum of C must be achieved in all required nursing courses for progression to the next level. Students may repeat a nursing course one time only.
3. A minimum grade-point ratio of 2.0 is required for registration in each clinical nursing course.
4. Courses used to satisfy General Education Requirements for writing, oral, and computer content have been selected and will be identified in next year's catalog. (See advisor.)

PARKS, RECREATION AND TOURISM MANAGEMENT

Bachelor of Science

The curriculum in Parks, Recreation and Tourism Management prepares students for a variety of careers in public and private leisure services. The undergraduate curriculum provides a broad exposure to the social, physical and biological sciences required to manage leisure service programs and resources, such as those for municipalities, institutions, voluntary and youth-service agencies, management positions within the travel and tourism industry, and as resource managers of local, state and federal parks and related lands and waters.

The flexible curriculum allows students to select from four emphasis areas: Community Leisure Services (including Sport Management); Recreation Resources Management; Therapeutic Recreation; and Travel and Tourism. This latitude permits accommodation of each student's career objectives such that he/she can prepare for positions in corporate/commercial fitness center management, sport management, city/county/campus recreation, cultural arts management, commercial recreation, wilderness management, nature interpretation, park management, historic site management, rehabilitation services, leisure counseling, camp administration, recreation therapy, programs for people with disabilities or senior citizens, travel industry, resorts management, convention and visitor bureaus, theme parks, community tourism, and special event/festival planning, to name a few. Emphasis area appropriate minors are encouraged.

The Parks, Recreation and Tourism Management program is accredited by the National Council on Accreditation (National Recreation and Parks Association/Council on Postsecondary Accreditation). Graduates are immediately eligible to apply to become a "Certified Leisure Professional," a valuable credential for professional advancement.

Graduate degrees offered are Master of Parks, Recreation and Tourism Management; Master of Science; and Doctor of Philosophy.

The Department of Parks, Recreation and Tourism Management is a South Carolina Commission on Higher Education "Commendation for Excellence" recipient and a top ranked program nationally.

Students will find it desirable to have a personal computer meeting or exceeding these resources: Pentium processor or equal, 540mb hard drive, 8mb RAM, 14.4 modem, monitor, and a letter quality printer.

Freshman Year**First Semester**

- 4 - BIOL 103 General Biology 1¹ or
 - 3 - GEOL 101 Physical Geology¹ and
 - 1 - GEOL 103 Physical Geology Lab.¹
- 3 - ENGL 101 Composition I
- 3 - PRMT 101 Concepts of Leisure
- 3 - PRMT 209 Professional Application of Microcomputers²
- 3 - Mathematics Requirement³

16

Second Semester

- 4 - BIOL 104 General Biology 1¹ or
 - 4 - Geology Laboratory Science¹
- 3 - ENGL 102 Composition II
- 3 - PRMT 205 Program and Event Planning
- 3 - Mathematics Requirement³
- 3 - Elective

16

Sophomore Year**First Semester**

- 3 - PRMT 201 The Recreation/Leisure Environ.
- 1 - PRMT 206 Practicum I
- 3 - PSYCH 201 Introduction to Psychology⁴ or
 - 3 - SOC 201 Introduction to Sociology⁴
- 3 - Emphasis or Study Area Requirement⁵
- 3 - Humanities Requirement⁶
- 3 - Literature Requirement⁷

16

Second Semester

- 1 - PRMT 207 Practicum II
- 3 - PRMT 308 Leadership and Group Processes in Recreation
- 3 - SPCH 250 Public Speaking
- 3 - Emphasis or Study Area Requirement⁵
- 3 - Social Science Requirement⁸

16

Junior Year**First Semester**

- 3 - PRMT 321 Recreation Administration
- 1 - PRMT 404 Field Training I
- 9 - Emphasis or Study Area Requirement⁵
- 3 - Writing Intensive Requirement³

16

Second Semester

- 3 - PRMT 305 Safety and Risk Management
- 3 - PRMT 309 Behavioral Concepts
- 7-8 - Emphasis or Study Area Requirement⁵
- 4-3 - Elective

17

Summer

- 6 - PRMT 405 Field Training II

Senior Year**First Semester**

- 3 - PRMT 409 Methods of Recreation Research I
- 10 - Emphasis or Study Area Requirement⁵
- 3 - Elective

16

Second Semester

- 1 - PRMT 406 Senior Seminar
- 3 - PRMT 410 Methods of Recreation Research II
- 9 - Emphasis or Study Area Requirement⁵
- 3 - Elective

16

135 Total Semester Hours

¹The student must complete an eight-hour sequence in the same science. Therapeutic Recreation and Sport Management students must take the general biology sequence.

²PRMT 209 or other General Education Computer Skills course(s).

³See General Education Requirements.

⁴Therapeutic Recreation emphasis students must take PSYCH 201 and SOC 201.

⁵See advisor for Emphasis Requirement and Study Area lists that specify courses to be taken this semester. The actual credits may vary depending on the courses selected. There is some variation in emphasis hours distribution among the four emphasis areas and the study area concentrations.

⁶Sport Management Study Area students must take PHIL 103. All others see footnote 3.

⁷ENGL 202, 203, 204, 205, 206, 207, 208, 209.

⁸Sport Management Study Area students must take ECON 200 (preferred), 211 or 212. Therapeutic Emphasis students see footnote 4. All others see footnote 3.

Note: Emphasis requirements to be selected from Community Leisure Services; Recreation Resource Management; Therapeutic Recreation; or Travel and Tourism. Study Area requirements to be selected from Sport Management concentrations in (1) Commercial Sport Management; (2) Institutional Sport Management; (3) Sports Communication Management; (4) Sports Health and Fitness Management; and; (5) Sport Marketing.

COURSES OF INSTRUCTION

This list of courses includes for each course the catalog number, title, credit hours, class laboratory hours per week, and the description. Courses numbered 600 and above are graduate courses. Computer skills, oral communication, and writing intensive equivalencies are noted in brackets (e.g., [W.3]). Where courses are offered on a schedule, there is a designation F, S, or SS following the title, indicating whether the course is offered in the fall, spring, or summer school.

ACCOUNTING

Professors: E. L. Bryan, L. S. Cash, J. R. Davis, T. L. Dickens, R. K. Doost, G. T. Friedlob, J. G. Louderback, R. E. Welton, Jr., A. J. Winters, *Director*; *Associate Professors:* L. S. Clark, A. C. Drews-Bryan, J. J. McMillan, L. P. Ramsay, L. S. Schleifer; *Assistant Professor:* J. B. Price; *Lecturers:* N. E. Byrley, E. H. Hicks, J. R. Madray, M. A. Prater, V. L. S. Ward

ACCT 200 Basic Accounting 3(3,0) This course is designed as a general survey of accounting for the student requiring only a basic knowledge of principles and concepts. May not be taken by students in curricula requiring ACCT 201 or 203.

ACCT 201, H201 Accounting Concepts I 3(3,0) Introduces accounting as a dynamic system providing financial information for economic decision making by owners, managers, investors, creditors, and others. Examines accounting from the perspective of the user, integrating basic financial, managerial, systems, audit and tax applications.

ACCT 202, H202 Accounting Concepts II 3(3,0) From the user's perspective, examines in more depth the role of accounting in debt/equity financing activities and decisions; investing activities and decisions; and operating activities and decisions. Briefly examines measuring, processing, and reporting financial information as a basis for better user understanding. *Preq:* ACCT 201.

ACCT 203 Financial Accounting 3(3,0) Emphasizes the principles and methods which influence the financial statements provided to external users. May not be taken by students in curricula requiring ACCT 200 or 201.

ACCT 204 Accounting Procedures I(1,2) Lectures, demonstrations, and hands-on experience with accounting systems and analysis required to complete the accounting cycle and prepare financial statements. Intended for students who will enroll in ACCT 301. *Preq:* ACCT 201. *Coreq:* ACCT 202.

ACCT 301, H301 Intermediate Accounting I 3(3,0) In-depth treatment of the traditional financial accounting topics of current and noncurrent assets and liabilities. Emphasis is placed on basic theory, valuation and measurement, as well as presentation and analysis. *Preq:* ACCT 202 and 204.

ACCT 302, H302 Intermediate Accounting II 3(3,0) Continuation of ACCT 301. In-depth treatment of equity, cash flows, and selected accounting topics such as tax allocation, postemployment benefits, and leases. Emphasis is placed on basic

theory, valuation and measurement, as well as presentation and analysis. *Preq:* ACCT 301.

ACCT 303, H303 Cost Accounting 3(3,0) The application of cost analysis to manufacturing and distributing problems. Analysis of behavior characteristics of business costs and a study of principles involved in standard cost systems. Lectures and problems. *Preq:* ACCT 202, 204 or consent of instructor.

ACCT 307, H307 Managerial Accounting 3(3,0) Emphasizes internal use of accounting data by the manager in establishing plans and objectives, controlling operations, and making decisions involved with management of an enterprise. Cannot be taken for credit by Accounting majors. *Preq:* ACCT 202 or 203.

ACCT 322 Accounting Information Systems 3(3,0) Formerly ACCT 422. Study of computer-based accounting systems with attention to systems design, application, internal control, auditing the system, and system security. *Preq:* CP SC 270. *Coreq:* ACCT 301.

ACCT 340 Internal Auditing Theory 3(3,0) Introduces the student to internal auditing and covers internal auditing standards, ethics, concepts, audit techniques, and reporting practices. Scheduling preference will be given to students who have completed 60, but not more than 100 credits. *Preq:* ACCT 301 and 322.

ACCT 399 Internship in Accounting 1(3,0-3,9) Preplanned, preapproved, faculty-supervised accounting internships designed to give students on-the-job learning opportunities that will support their classroom experiences. Credit will not be given for internships of less than six, full-time, consecutive weeks with the same internship provider. May be repeated for a maximum of three credits. To be taken Pass/Fail only. *Preq:* Junior standing and consent of instructor.

ACCT 404, H404, 604 Individual Taxation 3(3,0) Interpretation of Federal income tax laws, regulations, and court decisions with practice in application of these laws to the returns of individuals, partnerships, and corporations. *Preq:* ACCT 202 or 203 with consent of instructor.

ACCT 406 Business Taxation 3(3,0) Provides an introduction to the importance of taxation in business decision making. Emphasizes the interrelationship of taxes, the choice of business form, and various business transactions. Exposes students to the breadth of business decisions which are affected by the Federal Income Tax. *Preq:* ACCT 202 or 203 and consent of instructor.

ACCT 410 Budgeting and Executive Control 3(3,0) Study and application of selected techniques used in the planning and control functions of business organizations. *Preq:* ACCT 303.

ACCT 415 Auditing 3(3,0) Professional and practical auditing theory. Review of internal controls, audit procedures, and development of audit programs for various types of businesses; consideration of auditor's professional and ethical standards. *Preq:* ACCT 301 and 322.

ACCT 445 Internal Auditing Practice 3(3,0) Expands the student's knowledge of internal auditing practice, including operation audits, organization audits, quality-control audits, and organization theory. *Preq:* ACCT 340.

AEROSPACE STUDIES

Professor: M. L. Drinkhahn, *Chair*; *Assistant Professors:* D. L. O'Nan, R. S. Petree, Jr., J. N. Pruitt

A S 109 Air Force Today I 1(1,1) Course deals with the Air Force in the contemporary world through a study of the total force structure: strategic offensive and defensive, general purpose, and aerospace support. Leadership laboratory activities include drill fundamentals, customs, and courtesies of the service.

A S 110 Air Force Today II 1(1,1) Continuation of A S 109. Leadership laboratory includes drill, ceremonies, and an introduction to Air Force career opportunities.

A S 209 Development of Air Power I 1(1,0) Course includes the study of the development of air power from balloons and dirigibles through the peaceful employment of U.S. air power in relief missions and civic action programs in the late 1960s and also the air war in Southeast Asia. Leadership laboratory provides experience in guiding, directing, and controlling an Air Force unit.

A S 210 Development of Air Power II 1(1,1) Continuation of A S 209.

A S 309 Air Force Leadership and Management I 3(3,1) Course emphasizing the individual as a manager. Individual motivational and behavioral processes, leadership, communication, and group dynamics are covered to provide a foundation for the development of the Air Force officer's professional skills. Students will prepare individual and group presentations, write reports, participate in group discussions, seminars, and conferences.

A S 310 Air Force Leadership and Management II 3(3,1) Continuation of A S 309, using the basic managerial processes involving decision making, utilization of analytical aids in planning, organizing, and controlling environment. Actual case studies are used to enhance learning and communication processes.

A S 409 National Security Policy I 3(3,1) Analysis of the role and function of the military officer in a democratic society and the relationships involved in civil-military interactions. Students will be expected to prepare individual and group presentations for the class, write reports, and participate in group discussions.

A S 410 National Security Policy II 3(3,1) Continuation of A S 409, examining the environmental context in which U.S. defense policy is formulated and implemented. Emphasis placed on initial commissioned service and military justice. Students will be expected to prepare individual and group presentations for the class, write reports, and participate in group discussions, seminars, and conferences.

AFRICAN AMERICAN STUDIES

Professor: H. L. Suggs

A A S 301 Introduction to African American Studies 3(3,0) Study of African American experience from an Afrocentric perspective from colonial America to the present.

AS 498 Seminar on African American Studies 3(3,0) Research/writing seminar on the African American experience. Selected topics and themes from 1900 to present. *Preq:* AAS 301, HIST 311, 312 or 339.

AGRICULTURAL AND APPLIED ECONOMICS

Professors: D. L. Barkley, L. L. Bauer, G. L. Bradford, M. D. Hammig, M. S. Henry, J. C. Hite, J. H. Kahl, E. L. McLean, S. E. Miller, D. B. Smith, *Chair:* C. S. Thompson, G. J. Wells; *Associate Professors:* E. H. Kaiser, W. M. Smathers, Jr.

AP EC 202 Agricultural Economics 3(3,0)FS Analytical survey of the various subdivisions of agricultural economics, to include farm organization, enterprise, land economics, marketing, farm prices, governmental farm policies, and the relation of agriculture to the national and international economy.

AP EC 302 Economics of Farm Management 3(2,3)F Economic principles underlying the organization and operation of agricultural firms and related business enterprises. Particular emphasis is directed to management aspects of the farm as a production unit. *Preq:* AP EC 202 or ECON 211.

AP EC 308 Quantitative Applied Economics 3(3,0)S Basic quantitative relationships in applied economics are examined and interpreted. Emphasis is placed on the mathematical aspects of applied economics. Microcomputer software will be utilized for problem solving.

AP EC 309, H309 Economics of Agricultural Marketing 3(3,0)F General course in marketing agricultural commodities with particular emphasis upon food products. Efficiency criteria, consumer behavior, market organizations and institutions, and marketing functions are analyzed. *Preq:* AP EC 202.

AP EC 313 Principles of Real Estate Appraisal 3(3,0)FS Introduction to the basic principles and procedures of real estate appraisal. Topics include the real estate market, principles of valuation, legal concepts, and the application of the comparable sales, cost, and income approaches to real estate valuation. *Preq:* FIN 307 or consent of instructor.

AP EC 319 Agribusiness Management 3(3,0)F Study of the principles used in making management decisions and the application of these principles in agribusiness. Emphasis is given to the application of economics to the solution of problems facing managers of agricultural supply and marketing firms. *Preq:* AP EC 302 or 309.

AP EC 351 Agricultural Sales, Merchandising, and Advertising 3(3,0)FS Examination of professional selling and the roles and mechanisms of sales promotion and advertising in an agricultural environment. Topics include the sales process, promotion, and merchandising devices, media advertising, and display. *Preq:* Junior standing.

AP EC 352 Public Finance 3(3,0)S Principles of financing government, sources of public revenue, objects of public expenditures, problems of fiscal administration, and the application of fiscal policies in stabilizing the national economy. *Preq:* Junior standing.

AP EC (C R D) 361 Introduction to Health-Care Economics 3(3,0) See C R D 361.

AP EC 402, 602 Production Economics 3(3,0)F Economic analysis of agricultural production involving the concept of the farm as a firm, principles for decision making, the quantitative nature and use of production and cost functions and their interrelations and application of these principles to resource allocation in farms and among areas. *Preq:* AP EC 308 and ECON 314.

AP EC 403, 603 Land Economics 3(3,0)S Study of the characteristics of land and of the physical, legal, social, and economic principles and problems relating to the control and use of land resources. *Preq:* AP EC 202 or ECON 200.

AP EC 409, 609 Commodity Futures Markets 3(3,0)FS Introduction to the economic theory, organization, and operating principles of agricultural commodity futures markets in the United States. Emphasis is placed on speculating, hedging, and investing in agricultural commodity futures contracts from the standpoint of the agribusiness entrepreneur. *Preq:* AP EC 202 or ECON 211.

AP EC (C R D) 411, 611 Regional Impact Analysis 2(2,0) See C R D 411.

AP EC (C R D) 412, 612 Spatial Competition and Rural Development 3(3,0) See C R D 412.

AP EC 413, 613 Advanced Real Estate Appraisal 3(3,0)S Topics covered include highest and best use analysis, data collection, and analyses. Advanced appraisal procedures for income, cost and comparable sales approach to real estate valuation will be stressed. Eminent domain, the appraisal of property in transition, and specialized property will be covered. *Preq:* AP EC 313, FIN 307, or consent of instructor.

AP EC 420, 620 World Agricultural Trade 3(3,0)S Practical considerations of agricultural trade and trade policy analysis are reviewed. The role of international institutions is considered. Special emphasis is placed on concepts of agricultural trade, analysis of trade policies of major trading partners/competitors, and export/import marketing of products. *Preq:* AP EC 309, ECON 412, or consent of instructor.

AP EC 425, 625 Aquaculture Economics 3(3,0) Application of economics and business principles by firms engaged in fish farming. Basic microeconomic theory is reviewed and applied to aquacultural enterprises. Stress is given to financial management, investment analysis, and marketing management. Public policy affecting aquaculture is also discussed and international aquaculture development reviewed. *Preq:* AP EC 202 and 309 and W F B 350 or consent of instructor.

AP EC (AGRON) 426, 626 Cropping Systems Analysis 3(2,2)F See AGRON 426.

AP EC 433, 633 Agricultural Law and Related Environmental Issues 3(3,0)S Introduction to agricultural and agricultural-related environmental legal issues. Topics include a review of laws, agencies, programs, court structure, torts, taxation, biotechnology, land and water use, regulated industry and environment liabilities as they relate to agriculture and natural resources. *Preq:* LAW 322 or consent of instructor.

AP EC 452, H452, 652 Agricultural Policy 3(3,0)F Review of public agricultural policy programs in the United States and a critical examination of current and proposed government policies and programs affecting the agricultural sector of the economy. Included are economic considerations as related to past and current farm price and income problems. *Preq:* AP EC 302 and 309.

AP EC 456, H456, 656 Prices 3(3,0)S Review of the basic theory of price under competitive conditions and various modifications: nature, measurement and causes of daily, seasonal and cyclical price fluctuations; geographical price relationships; nature, function and behavior of futures markets; government price programs. *Preq:* AP EC 308, ECON 314, EX ST 462.

AP EC 460, 660 Agricultural Finance 3(3,0)S The study of the principles and technique of financing in the agricultural sector. Topics include the capital situation in agriculture, concepts of farm financial management, use of credit, capital markets, lending agencies, and estate planning. *Preq:* ACCT 200 or 201, AP EC 202.

AP EC 475, 675 Economics of Wildlife Management and Policy 3(3,0) Integrated approach to the study of the economics of wildlife. Topics include determination of market and nonmarket value, single and multiple species management, enterprise cost and returns, marketing wildlife, leasing methods, complementary and competitiveness with agricultural and forestry enterprises, and timber and crop damage cost estimates and control. *Preq:* AP EC 202, ECON 200, FOR 304, W F B 306, or consent of instructor.

AP EC 490 Selected Topics 1-15(0,2-30) Study of topics in applied economics. Topics may include classroom and/or field experience not normally covered in other classes. May be repeated for credit, but only if different topics are covered. *Preq:* Junior standing and/or consent of instructor.

AP EC (C R D) 491 Internship, Agribusiness, and Community and Rural Development 1-6(0,2-12) See C R D 491.

AGRICULTURAL EDUCATION

Professors: L. H. Blanton, *Acting Chair:* W. A. Shimmel; *Associate Professor:* J. G. Harper; *Assistant Professors:* R. L. Poling, C. D. White; *Instructors:* J. R. Holliday, M. F. McLeod

AG ED 100 Orientation and Field Experience 1(0,2)S Supervised observations and explanations of vocational agriculture teaching while serving as teacher aides. One full week of field experience in representative high schools is required.

AG ED 101 University Success Skills 2(3,0) Along with improving study and learning skills and maximizing all resources available for university success, people and procedures are featured as examples of successful characteristics for academics and careers. Selected activities provide self-determined strengths and weaknesses with prescriptive action. Limited to students in their first two semesters at Clemson.

AG ED 201 Introduction to Agricultural Education 3(2,3)F Principles of education, development of agricultural education, and an introduction to the formulation of instructional programs for the teaching of agricultural courses.

AG ED 300 Supervised Field Experience I 1(0,3) Actual participation in vocational agriculture teaching activities plus conferences with local supervising teachers and college supervisors. One full week of field experiences in specialized high school programs or area vocational centers is required.

AG ED 400 Supervised Field Experience II 1(0,3) Special emphasis is placed on enhancing existing knowledge and experiences of the students. The primary focus will be on becoming acquainted with the student teaching center well in advance of the customary twelve-week directed teaching experience.

AG ED 401, 601 Methods in Agricultural Education 3(2,3) Appropriate methods of teaching vocational agriculture in high schools. The course includes procedures for organizing teaching programs, teaching high school students, and directing FFA activities.

AG ED 403, 603 Principles of Adult/Extension Education 3(3,0) An overview of adult/extension education and adult learning. Selection of adult education providers will be reviewed with emphasis on extension. *Preq:* Junior standing or consent of instructor.

AG ED 406 Directed Teaching 12(0,36) Guided participation in the professional responsibilities of a teacher of vocational agriculture including an intensive study of the problems encountered and the competencies developed. Twelve weeks of directed teaching in selected schools are required. *Preq:* AG ED 400, 401.

AG ED 407 Internship in Extension Education 6(0,18) Interest and needs of students enrolled will be considered in placing agriculture majors and minors for practical experience. Internship placements may include county extension offices and other appropriate extension units. Six weeks of supervised experience must be completed. *Preq:* AG ED 400, Senior standing, and consent of instructor at registration.

AG ED 410, 610 History, Philosophy, and Future of the Land-Grant System 3(3,0) Provides a broad perspective of the American land-grant system. Major emphasis will examine assumptions and investigate the concepts, paradigms, issues, strategies, and programs of the system. Organizational structures, research methodologies, change processes, and adoption-diffusion strategies will also be examined. *Preq:* Junior standing or consent of instructor.

AG ED 423, 623 Curriculum 2(2,0) Curriculum goals and related planning for career and continuing education programs.

AG ED 425, 625 Teaching Agricultural Mechanics 2(1,3) Organizing course content, conducting and managing an agricultural mechanics laboratory, shop safety, microteaching demonstrations of psychomotor skills, and methods of teaching manipulative abilities.

AG ED 428, 628 Special Studies in Agricultural Education 1-3(1-3,0) Students are provided with an opportunity to study individually or collectively selected topics and/or problems in agricultural education to meet the particular needs of the clientele enrolled. May be taken for a maximum of six semester hours credit.

AG ED 431, 631 Methods in Environmental Education 3(3,0) Study of various techniques appropriate for teaching environmental education. Instruction is applicable to elementary, high school, and adult-level teachers. Offered in summer school only.

AG ED 432, 632 Visual Media for Agribusiness 3(2,3) Theoretical and practical course for professionals in agriculture with major emphasis on visual communications.

AG ED 440, 640 Program Development in Adult/Extension Education 3(3,0) Principles, theory, and practice in planning and conducting educational programs in adult/extension settings. *Preq:* Junior standing or consent of instructor.

AG ED 445, 645 Evaluation of Adult/Extension Education Programs 3(3,0) Philosophy and methodology of conducting evaluations of adult educational programs such as extension or adult continuing education programs. Emphasis will be on designing and conducting different types of program evaluations, including appropriate data collection methods. *Preq:* Junior standing or consent of instructor.

AG ED 450, 650 Modern Topics and Issues 3(3,0) A major area of concern to teachers of agriculture and county agents will be selected for intensive study at least one semester prior to offering the course. Team teaching with faculty from other departments in the College of Agriculture, Forestry and Life Sciences will be utilized when feasible. *Preq:* Junior standing or relevant experience.

AG ED (ED F, THRD) 480, 680 Educational Applications of Microcomputers 3(2,2) See ED F 480.

AG ED (ED F, THRD) 482, 682 Advanced Educational Applications of Microcomputers 3(2,2) See ED F 482.

AGRICULTURAL ENGINEERING

Professors: W. H. Allen, D. E. Brune, J. M. Bunn, *Chair:* J. A. Collier, J. C. Hayes, R. O. Hegg, D. E. Linville, R. K. White, R. E. Williamson, R. E. Young; *Associate Professors:* R. B. Dodd, Y. J. Han; *Instructor:* T. R. Garrett; *Lecturer:* R. G. Hammond

AG E 214 Fabrication and Manufacturing Methods for Agricultural Systems 2(1,3) Introduction to machine and structure fabrication for agricultural engineering related disciplines. Topics include metallurgy, arc and gas welding, fasteners, wood fabrication, plastics and protective coatings. *Preq:* E M 201. *Coreq:* E G 209.

AG E 221 Surveying for Soil and Water Resources 2(1,3) Fundamentals of land measurement and traverse computations. Surveying practice in traverse and topographic surveys preliminary to design of techniques and construction of structures for resource management. *Preq:* MTHSC 106.

AG E 322 Small Watershed Hydrology and Sedimentology 2(1,3) Fundamental relationships governing rainfall disposition are used as bases for defining the hydrology of watersheds. Application of modeling techniques appropriate for runoff and sediment control is emphasized. *Preq:* PHYS 122. *Coreq:* AGRON 202.

AG E 333 Environmental Modification and Control for Agricultural and Biological Systems 2(2,0) Principles of environmental modification and control including energy exchange, psychrometrics, heat and moisture balance, biological interactions, control systems and basic elements of heating, ventilation and air conditioning are presented. *Preq:* Junior standing.

AG E 350, H350 Microcomputer Controls in Biosystems 2(1,3) Microcomputer interfacing and digital control are studied for application to agriculture, aquaculture, biotechnology and other biosystems. Topics include digital electronic circuits and components, microcomputer architecture and interfacing. *Preq:* E C 307, ENGR 180, MTHSC 208.

AG E 356 Machine Operations for Agricultural and Biological Systems 3(2,3) Concepts of machine operations and machine systems for agricultural and biological applications. Selection, performance evaluation, economic analysis, and maintenance management for individual machines and machine systems. Computer applications for analyzing machine costs and other management factors. *Preq:* E M 201 or PHYS 122.

AG E 362, H362 Energy Conversion in Agricultural and Biological Systems 3(2,3) The energy requirements of biological and agricultural systems with emphasis upon direct energy conversion methods. Characteristics of various sources of energy will be considered including economic aspects. The present energy conversion mechanisms used in agriculture will be studied and their limitations presented. *Preq:* M E 310.

AG E 364 Agricultural Waste-Management Systems 2(2,0) The course will include planning and design of waste-management systems which employ physical, biological, and chemical processes for the treatment and utilizations of agricultural wastes. Solid, liquid, and gaseous wastes are considered. Presentation is relevant to current agricultural practices and legal and social restraints.

AG E (AGRON, E S E) 408, 608 Land Treatment of Wastewater and Sludges 3(3,0) See AGRON 408.

AG E 416, H416, 616 Mechanical Design for Agricultural and Biological Systems 3(2,3) Fundamentals of mechanical design with applications to machinery functions relating to soil, plants, and biological products. A design project is performed. *Preq:* E M 304.

AG E 421 Engineering Systems for Soil Water Management 2(1,3) Fundamentals of design related to drainage of lands, irrigation and modification of the microenvironment for optimum productivity are presented. *Preq:* MTHSC 208. *Coreq:* E M 320.

AG E (CH E) 428, 628 Biochemical Engineering 3(3,0) See CH E 428.

AG E 429 Applications in Biotechnology Engineering 3(2,3) Biological growth kinetics and reactor kinetics are applied to demonstrate the principles of ethanol production, cellulose conversion, and anaerobic processes. Integration of food production processes and waste treatment fundamentals of modeling biological processes are studied. Specific biotechnical applications such as plant tissue culture, advances in biosensor and biomechanical systems are analyzed. *Preq:* CH E (AG E) 428.

AG E (BIOSC) 430, 630 Engineering Modeling of Biological Systems 3(3,0) Examination of the principal mechanisms of energy capture and transformation in living organisms. Quantitative models of energetic reactions and associated transport processes are developed according to the principles of equilibrium and nonequilibrium thermodynamics. Topics include basic cell biology, photosynthesis, respiration, chemosmotic theory, electron transport, mass and energy transport phenomena. *Preq:* BIOCH 301, MTHSC 208 or consent of instructor. *Cores:* M E 310 or instruction in thermodynamics.

AG E 431, 631 Agricultural Structures and Environmental Design 3(2,3) Analytic design of statically determinate building components with emphasis on wood, steel, and concrete. Specific heating ventilation and air-conditioning systems for animal production are designed. *Preq:* E M 304.

AG E 442, 642 Properties and Processing of Biological Products 3(2,3) Study of engineering properties of biological materials and their uniqueness as design restraints on systems for handling, processing and preserving biological products. *Preq:* AG E 333, E M 304, 320, M E 310.

AG E 450, H450, 650 Instrumentation for Agricultural and Biological Systems 3(2,3) Overview of modern instrumentation techniques in agricultural and biological engineering systems. Emphasis is on laboratory use of equipment. Topics include performance characteristics of instruments, analog-signal conditioning, transducer theory and applications, and digital systems for data acquisition and control. *Preq:* AG E 350, familiarity with computer programming, or consent of instructor.

AG E (S E, FOR) 451, H451, 651 Newman Seminar and Lecture Series in Natural Resources Engineering 1(0,2) Topics dealing with the development and protection of land, air, water, and related resources will be covered by seminar with instructor and by invited lecturers. Current environmental and/or resource conservation issues will be addressed. *Preq:* Senior or Graduate standing, consent of instructor.

AG E (BIOSC) 458, H458, 658 Cell Physiology 3(3,0) See BIOSC 458.

AG E 471 Engineering Research and Management 2(1,3) A research project is conducted on an agricultural and biological engineering problem. Engineering economics, engineering creativity and project management are incorporated in addition to communications skills. *Preq:* Senior standing in Agricultural Engineering or other engineering curricula.

AG E 473 Special Topics in Agricultural Engineering 1-3(1-3,0) Comprehensive study of special topics in the field of agricultural engineering not covered in other courses. Special emphasis will be placed on independent pursuit of detailed investigations. May be repeated for a maximum of six credits, but only if different topics are covered.

AG E (S E, IE) 484, 684 Municipal Solid Waste Management 3(3,0) See S E 484.

AGRICULTURAL MECHANIZATION

Professors: W. H. Allen, D. E. Brune, J. M. Bunn, J. A. Collier, J. C. Hayes, R. O. Hegg, D. E. Linvill, R. K. White, R. E. Williamson, R. E. Young; *Associate Professors:* R. B. Dodd, Y. J. Han, J. G. Harper; *Instructor:* T. R. Garrett; *Lecturer:* R. G. Hammond

AG M 101 Introduction to Agricultural Mechanization and Business 1(0,3) Introduction to Agricultural Mechanization and Business program. An overview of the curriculum will be given and the opportunities for extracurricular activities explained. Long-term interaction between the department and alumni will be covered.

AG M 205 Principles of Farm Shop 3(2,3) Principles, techniques, and methods in the selection, proper use and maintenance of hand and power tools. Principal topics include welding, tool fitting, metalworking, woodworking, finishing and preserving, and heat treatment.

AG M 206 Agricultural Mechanization 3(2,3) The agricultural student is taught to apply physical principles and sound reasoning to the mechanization of modern agricultural production and processing enterprises. Planning efficient operational systems and wise selection of equipment, based on function and economic suitability are stressed. *Preq:* MTHSC 105, PHYS 207 or consent of instructor.

AG M 301 Soil and Water Conservation 3(2,3) Water management in agriculture is studied by applying principles of elementary surveying, mathematics, and fluid flow as related to soil-water-vegetation complexes in erosion control, water conservation, drainage, and irrigation.

AG M 303 Calculations for Mechanized Agriculture 3(2,3) Course designed to enhance the student's ability to analyze and solve a wide range of problems requiring engineering technology. Laboratory periods will be used to introduce the student to microcomputer hardware. Basic programming and typical applications to agricultural mechanization problems are included. *Preq:* PHYS 207 or consent of instructor.

AG M 401, 601 Environmental Control for Plants and Animals 1(1,0) Basic concepts of environmental control for plant and animal production and human housing are presented. Elements include heat transfer, psychrometry, heating, cooling, ventilation, and heat/moisture balances. *Preq:* PHYS 200 or consent of instructor.

AG M 402, 602 Drainage, Irrigation, and Waste Management 3(2,3) Continuation of AG M 302. Basic soil-water-plant relationships are used to determine the need for and methods of irrigation, drainage, and waste management. Topics covered will include irrigation methods, drainage needs, drainage methods, and waste-treatment methods. *Preq:* AG M 302.

AG M 403, 603 Structures for Plants and Animals 2(1,3) Structures for agricultural production systems are planned and designed with regard to function, materials, loads and component sizing, utilizing the approach of an engineering or construction technologist. *Preq:* PHYS 200 or consent of instructor.

AG M 406, 606 Mechanical and Hydraulic Systems 3(2,3) This course deals with power transmission systems for agricultural production with emphasis on mobile equipment. The characteristics, requirements, and design of both V-belt drive and roller-chain drives are presented. Emphasis is placed on hydraulic power transmission systems, including pumps, actuators, control devices, and hydraulic circuitry. *Preq:* AG M 206, PHYS 207 or consent of instructor.

AG M 408 Equipment Sales and Service 3(3,0) Agricultural equipment sales and service techniques, inventory and accounting procedures followed by the farm machinery industry.

AG M 452, 652 Farm Power 3(2,3) A study of tractors with emphasis upon internal combustion engines and the support systems necessary for their proper functioning. The application of power, maintenance, adjustment, and general repair are also considered. *Preq:* PHYS 207 or consent of instructor.

AG M 460, 660 Farm and Home Utilities 3(2,3) A course for undergraduate and graduate students in agriculture and related curricula, involving a study of electric and other utilities on the farm and in the home. Selection, installation, and maintenance of wiring systems, lighting systems, motors, controls, water systems, and waste disposal systems are emphasized. *Preq:* PHYS 208 or consent of instructor, Junior standing.

AG M 472 Seminar 1(1,0) Student will be introduced to the agribusiness world, professionalism, current topics of special interest, and financial and legal implications of modern agricultural production. *Preq:* Senior standing in Agricultural Mechanization and Business or consent of instructor.

AG M 473 Special Topics in Agricultural Mechanization 1-3(1-3,0) Comprehensive study and application of new technologies and methods not covered in existing courses. Emphasis is placed on independent study using innovative approaches to problem solving. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

AGRICULTURE

Professors: L. L. Bauer, O. J. Dickerson, J. R. Diehl, R. G. Halfacre, L. W. Hudson, D. E. Linvill, J. C. McConnell, Jr., E. L. McLean, V. L. Quisenberry, S. U. Wallace, G. J. Wells; *Associate Professors:* M. E. Richardson, P. A. Skewes; *Assistant Professors:* M. Hall, C. D. White

AGRIC 103 Introduction to Animal Industries 3(3,0) Fundamental and descriptive aspects of the animal industries as applied biology and major segments of food production and distribution systems. The subject matter will be presented by Animal, Dairy and Veterinary Science and Poultry Science Departments.

AGRIC 104, H104 Introduction to Plant Sciences 3(3,0) Fundamental course in plant sciences, including agronomic and horticultural crops of the major agricultural areas of the world and emphasizing the crops of South Carolina.

AGRIC 105 Agriculture and Society 3(3,0)F Examination of the structure, function, and importance of the food and resource base, production, supply, marketing, demand, capital, labor markets, and consumption behavior in the U. S.; economic and sociological issues affecting U. S. agriculture.

AGRIC 200 Agricultural Applications of Microcomputers 3(2,2) Provides an overview of microcomputer hardware and software encompassing word processing, spreadsheet, database management, utility, and graphic communications. It also includes specialized farm and agribusiness management and decision-making programs and criteria for evaluating and selecting hardware.

AGRIC 301 International Agriculture 3(3,0) Designed to acquaint the student with the systems of agriculture of the world. The approach is evolutionary. Main emphasis is on production as related to world climates and world population. Various geographical areas are considered. *Preq:* AP EC 202 or ECON 211.

AGRIC (EN SP) 315, H315 Environment and Agriculture 3(3,0) A survey of the interrelationships of the environment and current agriculture and agricultural practices to include both the environmental impacts of agriculture and the role of agriculture in conservation and improving the environment. *Preq:* Sophomore standing and two semesters of biology or chemistry.

AGRIC 401 International Agriculture Seminar 1(1,0)S A colloquium of current issues in world agriculture. Topics include population growth, food policy, technology transfer, and international trade. With consent of instructor, the course may be repeated for a total of two credits.

AGRIC 440, 640 Microclimatology 3(3,0) Study of energy balance in earth's atmosphere and soil: solar and thermal radiation, air and soil temperature, humidity, evaporation and the hydrologic cycle, wind fields. Weather variables to describe microclimates and the energy balance of plants, animals, and insects. Modification of microclimates. Rural and urban climates. *Preq:* PHYS 240 or equivalent or consent of instructor; second semester Junior or Senior standing.

AGRIC H491 Senior Honors Research 3(1,6) Senior Division Honors research in an agricultural sciences curriculum. Open to approved Honors Program students only. In consultation with and under the direction of a professor, the student will select a research topic, conduct experiments, record data, and make an oral presentation of results to the College Honors Program Committee.

AGRIC H492 Senior Honors Research 3(1,6) Continuation of AGRIC H491. Senior division honors research in an agricultural sciences curriculum. Upon termination of the research project, the student will submit a formal written report and make a final oral presentation of results to the College Honors Program Committee. Professor-student discussions of additional topics will be arranged.

AGRONOMY

Professors: S. R. Chapman, B. J. Gossett, W. D. Graham, Jr., *Chair*; J. H. Palmer, J. S. Rice, E. R. Shippe, H. D. Skipper, H. T. Skorupska, S. U. Wallace, T. Whitwell; *Associate Professors:* N. W. Ferguson, B. W. Pinkerton, W. C. Stringer

AGRON 100 Introduction to Agronomy 1(1,0)F Introduction to and survey of the agronomic and soil sciences and their application to current societal issues: career guidance, opportunities for professional certification, and discussion of skills used by agronomists and soil scientists.

AGRON 202 Soils 4(3,2)F,S Introduction to world land resources, soil formation, classification, and mineralogy. Emphasis is placed on the basic chemical and physical properties of soil. Soil microorganisms, plant nutrients, and fertilization are discussed. Soil properties are related to growth. *Preq:* CH 101, 102 or a geology sequence including GEOL 101, or consent of instructor.

AGRON 350 Practicum 1-3 Preplanned internship undertaken with an approved agency concerned with agronomic practices. Restricted to students with a major or minor in Agronomy. Maximum of three credits allowed. *Preq:* Consent of department chair.

AGRON 403, 603 Soil Genesis and Classification 2(1,3)F Study of soil morphology and characterization, pedogenic processes, soil-forming factors, and classification of soils. *Preq:* AGRON 202 or consent of instructor.

AGRON 404, 604 Soils and Land Use 2(1,3)F Soils interpretations for nonagricultural purposes and facilities. Emphasis on use of modern soil surveys and properties and features of soils important in nonfarm land uses. Not open to Agronomy majors or minors or to students who have taken AGRON 202.

AGRON 405, 605 Plant Breeding 3(2,2)S The application of genetic principles to the development of improved crop plants. Principal topics include the genetic and cytogenetic basis of plant breeding, mode of reproduction, techniques in selfing and crossing, methods of breeding, inheritance in the major crops, and biometrical methods. *Preq:* GEN 302 or equivalent.

AGRON 406 Special Problems 1-3(0,3-9) Course designed to acquaint undergraduate students with the scientific method. Literature investigation, planning, and execution of an experiment are integral parts of the course. Not available to AGRIC H491 and H492 students. Maximum of six credits allowed. *Preq:* Senior standing as a major or minor in Agronomy and consent of department chair.

AGRON 407, H407, 607 Weed Ecology and Management 3(2,2) Weeds, their introduction, ecology, methods of reproduction, dissemination, and management; chemistry and mode of action of herbicides, equipment and techniques of application; and a characterization of the common weeds of the Southeast. *Preq:* AGRIC 104, AGRON 202, or consent of instructor.

AGRON (AG E, E S E) 408, 608 Land Treatment of Wastewater and Sludges 3(3,0)S Principles for designing environmentally acceptable land application systems using municipal and industrial wastewater and sludges will be presented.

Topics include land-limiting constituent analysis; soil-plant interactions; system equipment and design; system operation and management; public acceptance, social, and regulatory issues. Case studies and field trip(s) are planned. *Preq:* Senior standing in Agriculture or Engineering or consent of instructor.

AGRON 421, 621 Principles of Field Crop Production 3(3,0) Principles for production of field crops. Topics include botany and physiology, tillage, harvesting, storage, and crop quality. Principles will be illustrated using examples from various crops. *Preq:* AGRIC 104 or equivalent introductory plant science, AGRON 202.

AGRON 422, 622 Major World Crops 3(3,0) Course will examine the distribution, adaptation, production, and utilization of major agronomic crops of the world. Emphasis given to crops important to U.S. agriculture. Specific crops to be discussed in more detail include corn, wheat, rice, sorghum, soybean, cotton, tobacco, and peanuts. *Preq:* AGRIC 104 or equivalent introductory plant science, AGRON 202.

AGRON 423, H423, 623 Field Crop—Forages 3(3,0)S Establishment, management and utilization of forage crops in a forage-livestock agroecosystem context. Hay, silage and pasture utilization are discussed. Computer model used to study complexity of forage-livestock production systems. *Preq:* AGRIC 104, AGRON 202, or consent of instructor.

AGRON 425, 625 Seed Science and Technology 3(2,2)S Even-numbered years. Topics include seed development, germination, dormancy, pathology, storage, and deterioration. Seed testing and commercial production of seed are also covered. Emphasis will be placed on useful applications of current seed science knowledge. *Preq:* AGRIC 104, BIOSC 205.

AGRON (AP EC) 426, 626 Cropping Systems Analysis 3(2,2)F Application of agronomic and economic principles in solving problems relating to the production and marketing of agronomic crops. A major part of the course will be a case study in which a detailed analysis of a farm, agribusiness or environmental situation will be made with students making formal written and oral presentations of results. *Preq:* AP EC 202, AGRIC 104, Junior or Senior standing.

AGRON (HORT) 433, 633 Integrated Weed Management for Agronomic and Horticultural Crops 3(2,2) See HORT 433.

AGRON 446, 646 Soil Management 3(3,0)F Basic soil properties are related to compaction, water and solute movement, and root growth. Practical management problems are considered and solutions developed based upon basic soil characteristics. Problems will include erosion, no-tillage, compaction, irrigation, leaching, waste application, golf-green management, and orchard establishment. *Preq:* AGRON 202.

AGRON 452, 652 Soil Fertility and Management 3(3,0)S Soil properties, climatic factors, and management systems in relation to soil fertility maintenance for crop production. Plant nutrition and growth in relation to crop fertilization and management. *Preq:* AGRON 202 or consent of instructor.

AGRON 453, H453, 653 Soil Fertility Laboratory 1(0,3)S The evaluation and interpretation of soil fertility production. *Preq:* AGRON 202 or consent of instructor.

AGRON 455 Seminar 1(1,0)F Student presentation of current agronomic topics of special interest in crop production appearing in recent scientific journals and other publications.

AGRON 475, H475, 675 Soil Physics and Chemistry 3(2,3)S Study of the principles of soil physics and chemistry and their applications. Topics include soil texture, structure, compaction, water relations, solute movement, mineral composition, adsorption phenomenon, and soil acidity. *Preq:* AGRON 202, CH 101, 112, PHYS 207.

AGRON 490, 690 Beneficial Soil Organisms in Plant Growth 3(3,0) Aspects of biological nitrogen fixation, mycorrhizal fungi, microbial-pesticide interactions, bioremediation, nutrient cycles, and biological pest control related to plant growth, soil/environmental quality; and sustainable agriculture will be covered. Students who desire laboratory experience in these topics can register for AGRON 406 after consultation with instructor. *Preq:* AGRON 202, MICRO 305, PL PA 401, or consent of instructor.

ANIMAL, DAIRY AND VETERINARY SCIENCES

Professors: A. B. Bodine II, D. L. Cross, J. R. Diehl, C. W. Foley, T. Gimenez, D. M. Henriks, L. W. Hudson, T. C. Jenkins, J. C. McConnell, Jr., G. C. Skelley, Jr., *Chair;* J. C. Spitzer, C. E. Thompson; *Associate Professors:* J. A. Bertrand, A. K. Greene, M. E. Richardson; *Lecturers:* L. K. Fulton, J. E. Hill

ADVSC 100 Orientation to Animal, Dairy and Veterinary Sciences 1(2,0)F Study of the role of animal agriculture in the world today with emphasis on supply and demand of end products and careers available in the animal industry.

ADVSC 101 Dairy Foods 1(1,0) Production aspects of dairy foods from the farmer to the consumer including such products as ice cream, yogurt, and various cheeses; the use of these foods for nutrition and pleasure. Students who have received credit for ADVSC 307 will not be allowed to enroll in or receive credit for ADVSC 101.

ADVSC 102 Mammalian Reproduction 1(1,0) Physiology and endocrinology of the reproductive processes in male and female mammals with emphasis on farm animals. Control of reproductive cycles, diseases, sexuality, and effects of drugs on reproduction will be discussed.

ADVSC 108 Animal and Dairy Science Techniques 1(0,2)S Basic principles in the handling of livestock and techniques of animal industries are discussed. Basics of animal anatomy, and equipment and facilities used in animal production are presented.

ADVSC 202 Introductory Animal Sciences 3(3,0)F Systematic coverage of the basic principles involved in breeding, feeding, management, and product marketing in beef and dairy cattle, swine, sheep, and horse operations.

ADVSC 203 Dairy Science Techniques 1(0,2)F Laboratories designed to demonstrate the basics of breeding, feeding, and management of dairy

cattle, quality control of milk, and processing of milk and dairy products. *Preq:* ADVSC 108.

ADVSC 205 Light Horse Management 2(1,3)F The light horse industry—development of breeds and their uses. Breeding, feeding, and management of light horses. Fundamental instruction in equitation.

ADVSC 210 Animal Science Techniques 1(0,2)F Livestock handling techniques used in the animal industry are discussed. Principles of animal care and management for livestock production are emphasized. *Preq:* ADVSC 108.

ADVSC 301, H301 Feeds and Nutrition 3(3,0)S Designed to familiarize the student with nutrients and feeds used in livestock and specialty animal production. Methods of evaluating common feedstuffs are covered along with a survey of the functioning of the various digestive systems. Practical aspect to feeding each species is covered. *Preq:* ADVSC 202, CH 101 and 102.

ADVSC 302 Principles of Livestock Selection 2(1,2)S Pedigrees, performance records, and visual appraisal techniques will be integrated to teach students to identify livestock to be kept for breeding purposes. Students enrolled in the course are eligible to compete in intercollegiate selection contests.

ADVSC 303 Livestock Evaluation 2(1,2)F Modern selection parameters are integrated with visual appraisal in the identification of body traits that will ultimately affect the market grades and economic value of live animals and their carcasses.

ADVSC 304 Evaluation of Dairy Products 2(1,2)S Emphasis is placed on sensory evaluation of dairy products. Discussion of basic principles of organoleptic evaluation, fundamental rules for scoring and grading dairy products. Evaluation of all classes of dairy products, based on established grades and score cards.

ADVSC 305 Meat Grading and Selection 2(1,2)S Classification, grading, and selection of beef, lamb, and pork carcasses, and wholesale cuts; and factors influencing quality and value will be studied. Students in this course are eligible to compete in intercollegiate meat-judging contests.

ADVSC 306 Feeds and Nutrition Laboratory 1(0,2)S Students learn procedures for formulating diets that meet nutrient requirements of livestock and poultry, utilizing traditional mathematical approaches and computerized formulation. Computerized least-cost formulation of diets is covered along with familiarization with feeding systems and approaches. *Preq:* ADVSC 202 and to be taken concurrently or to follow ADVSC 301.

ADVSC 309 Principles of Equine Evaluation 2(0,4) Study of conformation as it relates to locomotion, soundness, and breed standards is taught. Included are the rules and regulations of performance events and appropriate management of these events. Considerable time will be spent judging classes and delivering oral reasons.

ADVSC 310 Animal Disease and Sanitation 3(3,0)S Basic principles of animal health. Course emphasizes disease prevention in beef cattle, dairy cattle, goats, horses, poultry, and swine. The most common and important diseases and zoonosis of farm animals are explained. *Preq:* ADVSC 202.

ADVSC 311 Dairy Cattle Selection 2(1,2)S Emphasis is placed on the selection of dairy cattle for profitable herd operations. Evaluation of herd classification, fitting, showing and true types are made.

ADVSC 320 Veterinary and Medical Terminology 2(2,0) Course designed to promote students' understanding and use of basic scientific/medical terminology and concepts, especially those of basic science, biology, anatomy, physiology, and medicine. *Preq:* BIOL 103 and 104.

ADVSC 330 Animal Pathology 3(3,0)F Course designed to acquaint students with animal pathology including cell injury, inflammation, neoplasia, immunologic disease, and pathology of various organ systems.

ADVSC 353 Meats Laboratory 1(0,3) The selection and grading of meat animals and carcasses. Practical work in slaughtering of animals and in the cutting, curing, and freezing of meats. Emphasis is placed on the identification of wholesale and retail cuts. *Preq:* ADVSC 108 and 202.

ADVSC 355 Meats 2(2,0)S Study of the chemical and physical composition of meat, meat hygiene, nutritive value, curing, freezing, and meat by-products. *Preq:* ADVSC 108 and 202.

ADVSC 360 Internship 1-12(0,3-36) An off-campus, preplanned, supervised learning opportunity in an area related to animal, dairy or veterinary science. Students will submit periodic written reports and a final written report. To be taken Pass/Fail only. Limited to Animal, Dairy and Veterinary Sciences majors. *Preq:* Sophomore standing and consent of specific instructor coordinating the internship.

ADVSC 390 Practicum 1-3(0,3-9) An on-campus, preplanned, supervised learning experience in an area related to animal, dairy and veterinary sciences. Course will give experience not covered in other classwork. May be repeated for a maximum of four credits. *Preq:* Consent of specific instructor supervising practicum experience.

ADVSC 400, 600 Dairy Processing I 4(3,3)F Alternate years. Processing and distribution of fluid milk and other dairy products with emphasis on composition, quality control, chemical microbiological and public health aspects. *Preq:* BIOL 103, 104, CH 101, 102.

ADVSC 401, H401, 601 Beef Production 4(3,3)F Breeding, feeding, reproduction and management of beef cattle will be discussed. Emphasis is on production systems integrating disciplines of animal agriculture into management plans and alternatives. Practical applications of beef production and management practices will also be presented. *Preq:* ADVSC 202, 301.

ADVSC 402, 602 Dairy Processing II 4(3,3)S Alternate years. Continuation of Dairy Processing I, with emphasis on processing of cultured dairy products and frozen dairy products. Processing procedures, quality control, ingredients, formulations, and compositional and cultural characteristics of cultured and frozen dairy products will be discussed. *Preq:* ADVSC 400/600.

ADVSC 403, 603 Laboratory Techniques 3(2,3)F Research and quality control techniques commonly used in dairy science and related agri-sciences. *Preq:* CH 101, 102.

ADVSC 404, 604 Dairy Cattle Feeding and Management 4(3,2)F Alternate years. Fundamental principles in the care, feeding, and management of dairy cattle of all ages. Topics include general consideration in selecting a breed and the individual cow, calf raising, growth and development of dairy heifers, care and maintenance of the milking herd, and feeding for milk production. *Preq:* ADVSC 202 and 301.

ADVSC 405 Advanced Selection and Evaluation 2(0,4)F Class intended to provide special and advanced training in selection and evaluation of breeding, performance, and market animals or their products. Species used are beef and dairy cattle, sheep, swine, and horses. *Preq:* ADVSC 302 or 303 or 304 or 305, 309 or 311 and consent of instructor.

ADVSC 406 Seminars and Related Topics 2(2,0)F Designed to provide opportunity to prepare and deliver orally, technical information not fully covered in classwork, to aid in resume preparation, to introduce interviewing skills, and to acquaint students with industry expectations for Animal, Dairy and Veterinary Sciences graduates. *Preq:* SPCH 250.

ADVSC 407, 607 Equine Theriogenology 3(2,2)F Review of reproductive anatomy and physiology in the mare and stallion, induction of estrus and ovulation, practices for optimal reproductive efficiency, semen collection, preservation and transport, embryo transfer, regulatory aspects of reproduction by various breed registries, noninfectious and infectious diseases affecting reproduction, reproductive health management. *Preq:* ADVSC 453.

ADVSC 408, H408, 608 Pork Production 4(3,2)S Breeding, feeding, grading, marketing, and management of swine will be studied. Practical applications from all phases of the production cycle will be outlined in problem form to develop the student's problem-solving ability. *Preq:* ADVSC 202 and 301.

ADVSC 409, 609 Selected Topics 1-3(1-3,0) Comprehensive study of selected topics in animal, dairy and veterinary sciences not covered in other courses. May be repeated a maximum of six credits, but only if different topics are covered.

ADVSC 412, H412, 612 Horse Production 4(3,2)S Feeding, breeding, and management of the horse discussed in relation to health, genetics, reproduction, nutrition, and selection. *Preq:* ADVSC 202 and 301.

ADVSC 418 Muscle Biology and Lean Meats 3(2,2) Biology of animal muscle, connective, fat and bone tissue with laboratory emphasis on low fat sausages and restructured, value added meat products. *Preq:* ADVSC 202.

ADVSC 422 Special Problems 1-3(0,3-9) Laboratory, library, or field study of problems related to animal, dairy and veterinary sciences, emphasizing development and testing of hypothesis and reporting of results. May be repeated for a maximum of four credits. *Preq:* Junior standing and consent of specific instructor supervising the study.

ADVSC 452, H452, 652 Animal Breeding 3(3,0)S The fundamental principles relating to the breeding and improvement of livestock including variation, heredity, selection, linebreeding, inbreeding, crossbreeding, and other related subjects. *Preq:* ADVSC 202 and GEN 302.

ADVSC 453, H453, 653 Animal Reproduction 3(2,2)S Reproductive physiology and endocrinology of mammals with emphasis on farm animals and frequent reference to reproduction in laboratory animals and humans. *Preq:* ADVSC 202 and AN PH 301.

ADVSC 455, 655 Animal Reproductive Management 1(0,3)S Physiology and endocrinology of pregnant and nonpregnant cows are discussed. Emphasis is placed on methods of artificial insemination, pregnancy detection, and computer recordkeeping for achieving a high level of reproductive efficiency in cattle. *Preq:* ADVSC 202, AN PH 301, and to be taken concurrently or to follow ADVSC 453.

ADVSC 461, 661 Physiology of Lactation 2(2,0)S Anatomy and development of the mammary gland; physiological and biochemical regulation of mammary growth and milk secretion with emphasis on farm animals and reference to other mammals. *Preq:* ADVSC 202 and BIOCH 210.

ANIMAL PHYSIOLOGY

(See courses listed under Animal, Dairy and Veterinary Sciences; Entomology; Poultry Science; and Zoology)

Professors: G. P. Birrenkott, Jr., A. B. Bodine II, J. R. Diehl, H. E. Farris, C. W. Foley, T. Gimenez, D. M. Henricks, B. L. Hughes, R. J. Kendall, R. Noblet, T. R. Scott, J. C. Spitzer, R. J. Thurston, J. R. Tomasso, Jr.; *Associate Professors:* J. M. Colacino, M. E. Richardson; *Adjunct Associate Professor:* W. R. Boone

AN PH 301 Physiology and Anatomy of Domestic Animals 4(3,3)F Physiology and associated anatomy of the body systems, including nervous, skeletal, muscular, respiratory, digestive, circulatory, urinary, reproductive, and endocrine systems. Designed primarily for students in Animal, Dairy and Veterinary Sciences and Poultry Science. *Preq:* BIOL 103, 104 or 110, 111.

AN PH 401 Selected Topics 1-3(1-3,0) Comprehensive study of selected topics of interest in animal physiology and not covered in other courses. May be repeated once for a maximum of six credits, but only if different topics are covered.

AN PH 460, H460, 660 Systems Physiology 1(1,0)F Physiology of the digestive and endocrine systems. *Coreq:* BIOSC 459 or consent of instructor.

ANTHROPOLOGY

Associate Professor: J. M. Coggeshall

ANTH 201 Introduction to Anthropology 3(3,0) Cross-cultural examinations of contemporary human society; physical evolution of humans; the development of societies and archaeological record; environmental impact of human societies today.

ANTH 301 Cultural Anthropology 3(3,0) The nature of human culture; the constants and variants in human behavior affecting technology, social relations, social control, family systems, language, religion and art. *Preq:* ANTH 201 or consent of instructor.

ANTH 320 North American Indian Cultures 3(3,0) American Indian ethnography, using the culture area approach in studying adaptations of native peoples; includes a brief survey of American Indians today. *Preq:* ANTH 201 or consent of instructor.

ANTH 351 Physical Anthropology 3(3,0) Study of humans as biological organisms. Examines human evolution; primate social behavior; human physiological variations and disease resistance; and human skeletal anatomy and forensics.

ANTH 401, 601 Cultures and the Environment 3(3,0) Examines the global impact of humans on the environment. Traces the prehistoric development and historical consequences of population growth, agriculture, political and economic complexity. Future implications also are discussed. *Preq:* ANTH 201 and Junior standing, or consent of instructor.

ANTH 403, 603 Qualitative Methods 3(3,0) Methods and techniques of qualitative field research, including participant observation, ethnographic interviewing, data analysis, and report writing. *Preq:* ANTH 201 or consent of instructor.

ARCHITECTURE

Professors: J. F. Barker, J. R. Caban, Chair; L. G. Craig, M. A. Davis, T. K. Doruk, J. D. Jacques, Y. Kishimoto, R. B. Norman; *Associate Professors:* D. J. Allison, J. A. Burton, H. C. Harris, R. J. Hogan, N. J. Hurt, D. J. Hutton, G. W. Patterson, M. H. Rice; *Assistant Professors:* R. T. Huff, C. A. Jordan, R. K. McGill, R. T. Silence; *Lecturers:* M. E. Byington, B. Doruk, R. D. Eflin, S. G. Harrison, A. H. Jacques, P. R. Lee, R. C. Lowrey, C. L. Martin, J. P. Wilkerson, M. M. Wolfe, J. L. Young; *Visiting Associate Professor:* R. J. Miller

ARCH 201 The Art of Architecture 3(0,6) Examines basic concepts of architectural design from historical models to contemporary examples. Seminar discussions complement studio exercises and projects which concentrate on principles of design, materials of construction, programmatic concerns, and design theories. *Preq:* DSGN 151 and 153; 152 and 154.

ARCH 403, 603 The Modern Architectural Movement 3(3,0) Seminar in the analysis and criticism of architectural and town building works. The course sequence will include historic and contemporary examples, literary searches, field trips, essays, and oral reports. *Preq:* Senior standing or consent of instructor.

ARCH 404, 604 Current Directions in Architecture 3(3,0) The critical analysis of the development and current directions of modern movements in architecture. *Preq:* Senior standing or consent of instructor.

ARCH 405, 605 American Architectural Styles 1650-1950 3(3,0) Survey of American architectural styles and of the architects responsible for them, from the Colonial period to our recent past. Considerable emphasis will be placed on identifying those architectural elements which serve as clues in determining a building's architectural style.

ARCH 412, 612 Architectural History Research 3(3,0) Directed investigations related to the art and architectural heritage of Italy.

- ARCH 414, 614 Design Seminar 3(3,0)** Exploration of topical issues in architecture, art, construction, and planning.
- ARCH 415, 615 Field Sketching 3(0,6)** Study of media and techniques for expression, representation, and visual analysis through freehand perspective field drawing of the built and natural environment. *Preq:* College of Architecture students with Junior standing or consent of instructor.
- ARCH 416, 616 Field Studies in Architecture and Related Arts 3(0,9)** Documentation and analysis of architectural structures observed during European travels in graphic and written form.
- ARCH 421 Architectural Seminar 3(3,0)** Lectures and seminars dealing with pertinent topics related to environmental and technological considerations in architecture and the building industry. *Preq:* Senior standing or consent of instructor.
- ARCH 422 New Directions Seminar 3(3,0)** Exploration into careers which relate directly (i.e., construction law) or indirectly (i.e., public relations) to the making of our built environment.
- ARCH 424, 624 Product Design 3(0,9)** Furniture and product system design with emphasis on ergonomics and the relationship of form and materials. *Preq:* Senior standing and consent of instructor.
- ARCH 425, 625 Energy in Architecture 3(3,0)** Climate design methodology and its influence on building energy patterns and architectural form. *Preq:* Senior standing and consent of instructor.
- ARCH 426, 626 Architectural Color Graphics 3(2,3)** Architectural color graphics by computer. Theories of color classification and interaction; application of color theories to art and architecture. *Preq:* Consent of instructor.
- ARCH 427, 627 Advanced Color Graphics 3(2,3)** Theories of color classification and interaction; three-dimensional color modeling by computer; advanced application of color theories to art and architecture. *Preq:* ARCH 426 or consent of instructor.
- ARCH 428, 628 Computer-Aided Design 3(2,3)** Introduction to the concepts, skills and applications of computer-aided design as they relate to the practice of architecture. *Preq:* Senior standing or approval of instructor.
- ARCH 429, 629 Architectural Graphics 3(3,0)** Designed to provide students with an understanding of the concepts, skills, techniques, and strategies of visual presentation/graphics as they relate to the design professions—architects/landscape architects. *Preq:* Junior, Senior, Graduate standing, or consent of instructor.
- ARCH 430, 630 Theories and Philosophies of Technology and Architecture 3(3,0)** A theoretical and practical examination of technology and architecture from pre-modern and modern viewpoints to study its nonneutral role in shaping and reflecting knowledge, beliefs, and actions within a cultural context.
- ARCH 485, 685 Health Care Facilities Systems 3(3,0)** Course introduces the concepts, organization, and direction of health and health-care services within the context of health-care delivery systems. Special emphasis is placed on mental and physical health-care facilities concepts. *Preq:* Consent of instructor.

- ARCH 488, 688 Health Care Facilities Programming Techniques 3(3,0)** Seminar on recent research and innovations in health-care facilities programming and original investigation of assigned programming problems. *Preq:* Consent of instructor.
- ARCH 490, H490 Directed Studies 1-5** Comprehensive studies and research of special topics not covered in other courses. Emphasis will be placed on field studies, research activities, and current developments in architecture. *Preq:* Consent of department chair.
- ARCH 557 Architecture Studio 6(0,18)** City planning design and the development of complex building solutions.

ARCHITECTURE CHARLESTON PROGRAM

(See courses listed under each field of study.)

Assistant Professor: R. T. Huff, *Director; Associate Professor in Residence:* M. H. Rice

This program is located in Charleston, South Carolina, and is available to qualified undergraduate students in Architecture, Art, Construction Science and Management, and Landscape Architecture. Studio work is oriented towards design within this historic seaport setting. Students also enroll in classes at the University of Charleston campus. The program is enriched by visiting scholars and professionals from the area.

ARCHITECTURE OVERSEAS PROGRAM

(See courses listed under each field of study.)

Associate Professor in Residence: J. A. Burton; *Lecturers:* S. Fera, S. Fera

The Daniel Center for Urban Studies in Genoa, Italy, is available to qualified Master of Architecture, Construction Science and Management, Master of Fine Arts, Master of City and Regional Planning, and Professional Year Landscape Architecture students. Studio and classroom work in this historic port setting is enriched by visiting scholars and complemented by scheduled field trips, both in Italy and continental Europe.

ART

Professors: J. T. Acorn, *Chair;* S. M. Wang; *Associate Professors:* S. A. Cross, T. W. Dimond, M. R. Hudson, J. A. Stockham, M. V. Vatalaro; *Assistant Professor:* D. M. Detrich; *Lecturers:* C. L. Martin, E. A. Tallon, M. M. Wolfe

- ART 103 Visual Arts Studio 3(0,6)** Studio projects in basic visual elements and principles. The development of creative design process, visual organization, and design skills are introduced as a foundation for further study in visual arts. For non-College of Architecture majors—will not be accepted as credit in College of Architecture curricula.
- ART 205 Beginning Drawing 3(0,6)** A study of drawing based on the premise that drawing is a foundation discipline in the visual arts. Basic materials and approaches associated with drawing are studied and applied through studio practice,

augmented by critiques, demonstrations, and lectures. *Preq:* ART 103 or DSIGN 152 or consent of instructor.

- ART 207 Beginning Painting 3(0,6)** Introduction to the basic materials, methods and techniques of painting. The primary medium used is acrylic, and other painting media may also be introduced. Emphasis is placed on the basic skills in painting plus individual creative development. *Preq:* ART 103 or DSIGN 152 or consent of instructor.
- ART 209 Beginning Sculpture 3(0,6)** Studio courses investigating the meaning of sculpture through traditional and nontraditional approaches. Establishes a working knowledge of material and process in several media. Personal expression is encouraged and enhanced by employment of problem-solving techniques. Static, temporal, installation and site specific sculpture will be explored. *Preq:* ART 103 or DSIGN 152 or consent of instructor.
- ART 211 Beginning Printmaking 3(0,6)** Studio course designed to introduce basic techniques of relief printing, intaglio, lithography, silkscreen, and papermaking. Each semester concentrates on two or three of these techniques. Coursework integrates printmaking processes and creativity. *Preq:* ART 103 or DSIGN 152 or consent of instructor.
- ART 213 Beginning Photography 3(0,6)** Introduction to the use of photography as an art medium. Lectures and studio work cover the utilization of the camera, processing and printing in black and white, with emphasis on perception and creative expression. *Preq:* ART 103 or DSIGN 152 or consent of instructor.
- ART 215 Beginning Graphic Design 3(0,6)** Introduction to the fundamental techniques, concepts, and principles of visual communication. Through a series of projects and studio work, students will explore techniques of communication through the use of type design, typography, photography, illustration, symbolism, and product design. Individual creative development will be stressed. *Preq:* ART 103 or DSIGN 152 or consent of instructor.
- ART 217 Beginning Ceramics 3(0,6)** Basic studio course introducing ceramic arts through its various processes and techniques. Hand building methods as well as throwing on the potter's wheel are developed. Weekly projects emphasize imagination, self-expression, and skill development. Ceramic history is introduced through slide lectures. *Preq:* ART 103 or DSIGN 152 or consent of instructor.
- ART 219 Beginning Papermaking 3(0,6)** Designed to explore paper, not just as a surface to receive an image, but as a material capable of being an artistic expression in and of itself. *Preq:* ART 103 or DSIGN 152 or consent of instructor.
- ART 305 Drawing 3(0,6)** Study of human figure drawing with primary emphasis on drawing from live models. The student's drawing skills and fundamental understanding of the structure and form of the human figure are reviewed through studio practice, augmented by critiques, demonstrations, and lectures. *Preq:* ART 205 or consent of instructor.

ART 307 Painting 3(0,6) Continuation of ART 209 with increased emphasis on personal expression and growth in technical competence. Some study of painting history is included in studio activity. *Preq:* ART 207 or consent of instructor.

ART 309 Sculpture 3(0,6) Continuation of ART 209 with increased emphasis on personal expression and content of work. Further exploration of materials and processes including an introduction to foundry casting and advanced welding techniques. Individual investigation into current and historical aspects of sculpture will be required. *Preq:* ART 209 or consent of instructor.

ART 311 Printmaking 3(0,6) Continuation of processes in beginning printmaking with emphasis on expanding the range and depth of technique. The relationship of technique and process to creative idea development is emphasized. *Preq:* ART 211 or consent of instructor.

ART 313 Photography 3(0,6) Continuation of ART 213. Advanced techniques and more diverse types of film and paper are used in making images of personal and expressive nature. The design and construction of a view camera, printing in color, and multiple imagery may also be included. *Preq:* ART 213 or consent of instructor.

ART 315 Graphic Design 3(0,6) Continuation of concepts and techniques introduced in ART 215 with emphasis on more applied projects. Individual creative solutions are emphasized. *Preq:* ART 215 or consent of instructor.

ART 317 Ceramic Arts 3(0,6) Continuation of skill development leading to more challenging projects and independent efforts. Further exposure to ceramic history and ceramic technology is presented. *Preq:* ART 217 or consent of instructor.

ART 321 Art with the Computer 3(0,6) Studio course using the microcomputer as an art medium. Studies in imaging systems, with emphasis on the creative use of the medium for artistic expression. *Preq:* ART 103 or DSIGN 152.

ART 405, 605 Advanced Drawing 3(0,6) Advanced level studies of drawing which explore the synthesis of refined drawing skills and philosophies of art. The student's understanding of drawing as a form of art is developed through studio practice augmented by critiques, demonstrations, lectures, field trips, and independent research. *Preq:* ART 305 or consent of instructor.

ART 407, 607 Advanced Painting 3(0,6) Advanced studio course in painting. Student selects painting media and is expected to develop a strong direction based on prior painting experience. Study of contemporary painters and directions is included. *Preq:* ART 307 or consent of instructor.

ART 409, 609 Advanced Sculpture 3(0,6) Intensive independent studio concentration to further develop personal direction and content. Continued investigation of sculptural context, materials and processes, and relative historical research are emphasized. *Preq:* ART 309 or consent of instructor.

ART 411, 611 Advanced Printmaking 3(0,6) Culmination of process, techniques, and individual development. Students are expected to have mastered process and technique for the benefit of the image produced. Creativity and self-expression are highly emphasized as students select a process for concentrated study. *Preq:* ART 311 or consent of instructor.

ART 413, 613 Advanced Photography 3(0,6) Continuation of ART 313. Advanced processes in photography. *Preq:* ART 313 or consent of instructor.

ART 415 Advanced Graphic Design 3(0,6) Continuation of ART 315. Personal expression through communication techniques will be further explored. Individual projects will be emphasized. *Preq:* ART 315 or consent of instructor.

ART 417, 617 Advanced Ceramic Arts 3(0,6) Students are directed toward further development of ideas and skills. Glaze calculation and firing processes are incorporated to allow for a dynamic integration of form and ideas. *Preq:* ART 317 or consent of instructor.

ART 420, 620 Selected Topics in Art 1-3(0,6-9) Intense course in studio art. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Senior standing or consent of instructor.

ART 471 Bachelor of Fine Arts Senior Studio I 5(0,15) Individual studio project directed by an instructor and determined by the student in consultation with the instructor. Usually focused upon a particular studio area, concept, or theme. *Preq:* Senior standing and have completed the 300/400 sequence in the discipline in which they choose to complete senior studio.

ART 472 Bachelor of Fine Arts Senior Studio II 5(0,15) Individual studio project directed by an instructor and determined by the student in consultation with the instructor. Usually focused upon a particular studio area, concept, or theme. *Preq:* ART 471, Senior standing.

ART 490, H490, 690 Directed Studies 1-5(0,2-10) Study of areas in the visual arts that are not included in other courses or advanced work in addition to other courses. Directed studies must be arranged with a specific professor prior to registration.

ART AND ARCHITECTURAL HISTORY

Professor: E. C. Voelker; *Associate Professors:* J. B. LeBlanc, G. L. Walker; *Lecturer:* D. W. Houston; *Visiting Associate Professor:* B. R. Collins

A A H 101, H101 Survey of Art and Architectural History I 3(3,0) Survey of architectural design and the decorative arts, landscape and building technology in the Ancient Near East, Egypt, Greece, Rome, Byzantium, as well as Romanesque and Gothic Europe.

A A H 102, H102 Survey of Art and Architectural History II 3(3,0) Survey of Renaissance, Baroque and Neoclassical art and architecture. Introduction to the Modern Movement in Europe and America. *Preq:* A A H 101.

A A H 203, H203 History and Theory of Architecture I 3(3,0) First of a two-semester sequence of special topics and issues in the history of architecture. Emphasis on architectural theory and practice in the past and present. Analysis of differing approaches to history: chronological, typological, thematic, phenomenological. *Preq:* A A H 102.

A A H 204, H204 History and Theory of Architecture II 3(3,0) Second of a two-semester sequence on special topics and issues in the history

of architecture. Emphasis on typologies of the house, governmental buildings, and sacred architecture. New directions in architectural historiography. *Preq:* A A H 203.

A A H 205, H205 History and Theory of Art I 3(3,0) First of a two-semester sequence on special topics and issues in the history of art. Emphasis on stylistic developments and specific art movements. Analysis of art within the larger context of social, political, religious history. Examination of art techniques and theory as they have developed. *Preq:* A A H 102.

A A H 206, H206 History and Theory of Art II 3(3,0) Second of a two-semester sequence on special topics and issues in the history of art. Continued emphasis on stylistic developments and art movements, with specific attention directed toward post-Renaissance art. Analysis of the influence of past history on modern. *Preq:* A A H 205.

A A H 210 Introduction to Art and Architecture 3(3,0) This one-semester lecture survey will introduce to the nonmajor student an overview of art and architecture from different time periods and cultures. Students will be encouraged to appreciate the contribution to art made by the great masters and to discern different styles, art techniques, and creative traditions.

A A H 301 Research Methodology 3(3,0) Introduction to the techniques of research through proposed subjects, library and computer research, critical written evaluations, and the preparation of written presentations.

A A H 305 Contemporary Art History 3(3,0) Study of contemporary art from World War II to the present, exploring the forces that have shaped the various movements and directions. *Preq:* A A H 206.

A A H H330 Honors Colloquium 3 Undergraduate honors colloquium with emphasis on interdisciplinary interpretations. An integration of art, architecture, landscape, and city planning. *Preq:* A A H 204 or 206 or consent of instructor.

A A H 391 Italian Studies Abroad I 3-6(3-6,0) SS On-site exposure of specific works of art and architectural monuments in Italy, coupled with lectures and study problems. May be taught alternately as a compact short course during the academic year with a short stay in Italy or during the summer with an extended foreign experience. May not be taken Pass/Fail. *Preq:* A A H 204 or 206 or consent of instructor.

A A H 392 British Studies Abroad I 3(3,0) On-site exposure to specific works of art and architectural monuments in Great Britain, coupled with lectures and study problems. May be taught alternately as a compact short course during the academic year with a short stay in Britain or during the summer with an extended foreign experience. May not be taken Pass/Fail. *Preq:* A A H 204 or 206 or consent of instructor.

A A H 393 French Visual Studies Abroad I 3(3,0) On-site exposure to specific works of art and architectural monuments in France, coupled with lectures and study problems. May be taught alternately as a compact short course during the academic year with a short stay in France, or during the summer with an extended foreign experience. May not be taken Pass/Fail. *Preq:* A A H 204 or 206 or consent of instructor.

A A H 394 Northern European Visual Studies Abroad I 3(3,0) On-site exposure to art and architecture in Northern European countries such as Belgium, Germany, and Holland coupled with lectures and study problems. May be taught alternately as a compact course during academic year with short stay in Northern Europe, or during summer with extended foreign experience. May not be taken Pass/Fail. *Preq:* A A H 204 or 206 or consent of instructor.

A A H 395 Special Topics in Visual Studies Abroad I 3(3,0) On-site exposure to art and architecture in foreign countries, coupled with lectures and study problems. Different countries may be selected for study at faculty discretion. May be taught as a compact course during academic year with short stay in foreign country, or during summer with extended foreign experience. May not be taken Pass/Fail. *Preq:* A A H 204 or 206 or consent of instructor.

A A H 396 Special Topics in Visual American Studies I 3(3,0) On-site exposure to specific works of art and architectural monuments throughout the U.S., coupled with lectures and study problems. May be taught alternately as a compact short course during the academic year with a short trip to areas of interest, or during the summer with extended travel. May not be taken Pass/Fail. *Preq:* A A H 204 or 206 or consent of instructor.

A A H 411, 611 Directed Research in Art and Architectural History 3(3,0) Comprehensive studies and research of special topics not covered in other courses. Emphasis will be placed on field studies, research activities, and current developments in art history.

A A H 412, 612 Directed Research in Art and Architectural History 3(3,0) Continuation of A A H 411.

A A H 416 History of Landscape Architecture 3(3,0) Planetary survey of notable examples of mankind's constant efforts to arrange and bring order to his environment by design on the land. *Preq:* Junior standing or consent of instructor.

A A H 417, 617 Studies in the Art and Architecture of the Ancient World I 3(3,0) Consideration of the visual arts and architectural monuments of the Ancient World (Egypt, the Near East, Greece, and Rome) with a study in depth of selected examples from the period. *Preq:* A A H 204 or 206 or consent of instructor.

A A H 418, 618 Studies in the Art and Architecture of the Ancient World II 3(3,0) Consideration of the visual arts and architectural monuments of the Ancient World (Egypt, the Near East, Greece, and Rome), with a study in depth of selected examples from the period. *Preq:* A A H 417.

A A H 419, 619 Studies in the Art and Architecture of the Early Middle Ages 3(3,0) Consideration of the visual arts and architectural monuments of the Early Middle Ages (Byzantine and Western Europe from the 4th through 12th centuries), with a study in depth of selected examples from the period. *Preq:* A A H 204 or 206 or consent of instructor.

A A H 420, 620 Studies in the Art and Architecture of the Late Middle Ages 3(3,0) Consideration of the visual arts and architectural monuments of the late Middle Ages (Western Europe from the 12th through the 15th centuries), with a study in depth of selected examples from the period. *Preq:* A A H 419.

A A H 423, 623 Studies in the Art and Architecture of the Renaissance I 3(3,0) Consideration of the visual arts and architectural monuments of the Renaissance (Western Europe from the 15th through the 18th centuries), with a study in depth of selected examples from the period. *Preq:* A A H 204 or 206 or consent of instructor.

A A H 424, 624 Studies in the Art and Architecture of the Renaissance II 3(3,0) Consideration of the visual arts and architectural monuments of the Renaissance (Western Europe from the 15th through the 18th centuries), with a study in depth of selected examples from the period. *Preq:* A A H 423.

A A H 425, 625 Architecture of the Technical Revolution 1685-1865 3(3,0) Consideration, in depth and particular, of the impact on architecture of the applied scientific method as it produced mechanical inventions, new construction material and methods, new power sources and production technique, and the social adjustments which all of these initiated. *Preq:* A A H 204 or 206 or consent of instructor.

A A H 427, 627 Eighteenth Century Visual Arts 3(3,0) Consideration of the visual arts: sculpture, painting, graphics, and furnishings of the 18th century in its environment, together with its precursors and later influence (1785-1815). *Preq:* A A H 204 or 206.

A A H 428, 628 Nineteenth Century Visual Arts 3(3,0) Consideration of the visual arts of the 19th century: painting, sculpture, printmaking, ceramics, and so forth, in relation to the factors that have influenced the artist and the consequence on society. *Preq:* A A H 427.

A A H 429, 629 Studies in the Art and Architecture of India and the Far East 3(3,0) Consideration of the visual arts and architectural monuments of India and the Far East, with a study in depth of selected examples from the period. *Preq:* A A H 204 or 206 or consent of instructor.

A A H 430, 630 Twentieth Century Art I 3(3,0) This course will acquaint the student with the major artists' monuments and issues of the Modern period in art. Through lecture/discussions and the reading of primary sources, this course will place the major modern movements in the context of the period (1860s-1945). *Preq:* Consent of instructor.

A A H 432, 632 Twentieth Century Art II 3(3,0) Provides the student with an overview of trends in art and architecture since World War II. Specific artists, artworks, and movements will be presented in a socio/historic context, with specific emphasis on the transition from a late-modernist to a post-modern perspective. *Preq:* Consent of instructor.

ASTRONOMY

Professors: D. D. Clayton; *Associate Professors:* T. F. Collins, P. J. Flower, D. H. Hartmann, M. D. Leising, B. S. Meyer

ASTR 101 Solar System Astronomy 3(3,0) A descriptive survey of the universe, with emphasis on basic physical concepts and the objects in our solar system, is presented. Related topics of current interest will be included. For nonscience majors. This course may not be taken by a student who has completed ASTR 301.

ASTR 102 Stellar Astronomy 3(3,0) A descriptive survey of the universe, with emphasis on basic physical concepts and galactic and extragalactic objects, is presented. Related topics of current interest will be included. For nonscience majors. This course may not be taken by a student who has completed ASTR 302.

ASTR 103 Solar System Astronomy Laboratory 1(0,2) Optional laboratory to accompany ASTR 101. Demonstrations, laboratory exercises and planetarium visits will supplement the lecture course. *Coreq:* ASTR 101.

ASTR 104 Stellar Astronomy Laboratory 1(0,2) Optional laboratory to accompany ASTR 102. Demonstrations, laboratory exercises and planetarium visits will supplement the lecture course. *Coreq:* ASTR 102.

ASTR (GEOL) 220 Planetary Science 3(3,0) See GEOL 220.

ASTR 302 Stellar Astrophysics 3(3,0) Study of the basic physical concepts necessary for understanding the sun, other stars, and their evolution. Topics include star formation, stellar structure and evolution, binary stars, and observational techniques. *Preq:* PHYS 221 or consent of instructor.

ASTR 303 Galactic Astrophysics 3(3,0) Study of the basic physical concepts necessary for understanding the structure of the galaxy, the motions of the stars within it, the nature of the interstellar matter, other galaxies, the large-scale structure of the universe, and the origin of the solar system. *Preq:* PHYS 221 or consent of instructor.

ASTR 475, 675 Selected Topics in Astrophysics 1-3(0-3,0-9) Comprehensive study of an area of astrophysics. Areas to be studied may include nucleosynthesis and stellar evolution, extragalactic distance scale, structure and evolution of galaxies, and large-scale structure of the universe. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* ASTR 302 or consent of instructor.

BIOCHEMISTRY

Professors: C. S. Brown, R. H. Hilderman, G. L. Powell, J. M. Shively, J. K. Zimmerman, *Chair*; *Associate Professors:* A. G. Abbott, J. D. Weinstein; *Assistant Professor:* W. R. Marcotte, Jr.; *Adjunct Professor:* D. M. Henricks

BIOCH 210 Elementary Biochemistry 3(3,0) Discussion of the kinds of compounds found in living organisms, their biochemical reactions and significance. *Preq:* CH 102 or 112.

BIOCH 211 Elementary Biochemistry Laboratory 1(0,3) Introduces students to basic biochemical techniques. *Preq:* BIOCH 210.

BIOCH 301 General Biochemistry 3(3,0) Introduction to the nature, production, and replication of biological structure at the molecular level and its relation to function. *Preq:* Organic Chemistry.

BIOCH 302 Molecular Biology Laboratory 1(0,3) Laboratory to accompany BIOCH 301. Introduction to fundamental laboratory techniques in biochemistry and molecular biology and a demonstration of some of the fundamental principles of molecular biology discussed in BIOCH 301. *Preq:* Organic Chemistry. *Coreq:* BIOCH 301.

BIOCH 406, 606 Physiological Chemistry 3(3,0) Chemical basis of the mammalian physiological processes of muscle contraction, nerve function, respiration, kidney function, and blood homeostasis is studied. Composition of specialized tissue such as muscle, nerve, blood and bone, and regulation of water, electrolytes and acid-base balance is discussed. *Preq:* BIOCH 210 or Organic Chemistry.

BIOCH 423, 623 Principles of Biochemistry 3(3,0) Study of the chemistry of amino acids, monosaccharides, fatty acids, purines, pyrimidines and associated compounds leads to an understanding of their properties and the relationship between structure and function that make them important in biological processes. The use of modern techniques is stressed. *Preq:* CH 224 or equivalent.

BIOCH 431, H431, 631 Physical Approach to Biochemistry 3(3,0) Study of chemical and physical properties of amino acids, lipids, nucleic acids, sugars and their biopolymers. Physical and mathematical analyses will be correlated with biological structure and function. *Preq:* One year of Organic Chemistry and BIOCH 301 or consent of instructor. *Coreq:* Physical Chemistry.

BIOCH 432, H432, 632 Biochemistry of Metabolism 3(3,0) Study of the central pathways of carbohydrate, lipid, protein, and nucleic acid metabolism. Bioenergetics, limiting reactions, and the regulation and integration of the metabolic pathways will be emphasized. *Preq:* BIOCH 431 or consent of instructor.

BIOCH 433, 633 General Biochemistry Laboratory 1(0,4) Experiments selected to illustrate current methods used in biochemical research. *Preq:* Concurrent enrollment in BIOCH 423 or 431.

BIOCH 434, 634 General Biochemistry Laboratory II 2(0,4) Continuation of BIOCH 433. *Preq:* Concurrent enrollment in BIOCH 432.

BIOCH 491, H491 Special Problems in Biochemistry 1-8(0,3-24) Orientation in biochemical research (i.e., experimental planning, execution, and reporting). May be repeated for a maximum of eight credits.

BIOENGINEERING

Professors: R. L. Dooley, Chair; A. F. von Recum; *Associate Professors:* M. LaBerge, R. A. Latour, Jr., D. L. Powers; *Assistant Professors:* V. M. Gharpuray, Y. Tian

BIO E 201 Organs and Their Replacements 3(3,0) Designed to provide engineering, biological, and physical science students with an overview of the replacement of human body parts and the problems related to artificial devices.

BIO E 302 Biomaterials 3(3,0) Study of metallic, ceramic and polymer materials used for surgical and dental implants. Materials selection, implant design, physical and mechanical testing, Corrosion and wear in the body. In addition, physical and mechanical properties of tissue as related to microstructure are studied. *Preq:* CR E 210 or consent of instructor.

BIO E 320 Biomechanics 3(3,0) Study of the relation between biological and mechanical functions of musculoskeletal tissues such as bone, ligaments, muscles, cartilage, etc.; mechanics of human joints; analysis of implants and implant failure. *Preq* or *Coreq:* E M 304 or consent of instructor.

BIO E 401 Biomedical Design 3(3,0) Covers basic steps in designing medical devices intended for short- or long-term implantation. Materials selection, fabrication processes, performance standards, cost analysis, and design optimization will be covered. A design project will be required. For engineering majors only. *Preq:* BIO E 302, 320, E M 304.

BIO E 420 Sports Engineering 3(3,0) Study of engineering principles involved in sports: body systems in human motion, analysis of gait, basic performance patterns in athletic movements, performance improvements, design of sports equipment. *Preq:* BIO E 302 and 320 or consent of instructor.

BIO E 450, H450 Special Topics in Bioengineering 1-4(1-4,0) Comprehensive study of a topic of current interest in the field of biomedical engineering under the direct supervision and guidance of a faculty member. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

BIO E 480 Research Principles and Concepts 1(1,0) Introduces senior undergraduate and graduate students to the principles and practices of scientific research. Topics include developing scientific concepts, developing projects, pursuing research, collaborating in multidisciplinary teams, patenting and publishing technical and scientific information, and reviewing professional and ethical standards of performance. To be taken Pass/Fail only.

BIOLOGICAL SCIENCES

Professors: R. E. Ballard, N. D. Camper, L. A. Dyck, J. E. Fahey III, S. A. Gauthreaux, Jr., R. L. Hays, C. W. Helms, T. M. McInnis, Jr., G. P. Noblet, E. B. Pivovarov, E. E. Ruppert, J. E. Schindler, A. P. Wheeler, B. G. Wixson, J. B. Wourms, J. K. Zimmerman, Chair; *Associate Professors:* J. M. Colacino, D. G. Heckel, R. R. Montanucci, T. P. Spira, D. W. Tonkyn, D. G. Yardley

BIO SC 101 Frontiers in Biology I 1(1,0) Course introducing Biological Sciences majors to recent advances in molecular and cellular biology. Areas to be covered include genetic engineering, genetics, cell biology and development. *Preq:* BIOL 103 or 110 or permission of course coordinator.

BIO SC 102 Frontiers in Biology II 1(1,0) Course introducing Biological Sciences majors to recent advances in organismal and evolutionary biology. Areas to be covered include ecology, evolution, behavior and organismal biology. *Preq:* BIOL 103 or 110 or consent of course coordinator.

BIO SC 205 Plant Form and Function 3(3,0) Introductory course designed for students majoring in plant sciences of the College of Agricultural Sciences and the College of Forest and Recreation Resources. The course integrates lecture and laboratory and emphasizes fundamental structures and functions of higher plants. *Preq:* BIOL 103 or consent of instructor.

BIO SC 206 Plant Form and Function Laboratory 1(0,3) This course will serve as the laboratory for BIO SC 205 for students majoring in Agricultural Sciences and Forest and Recreation Resources. *Preq* or *Coreq:* BIO SC 205 or consent of instructor.

BIO SC 210 Biology of Culture and Religion 3(3,0) Drawing on findings from sociobiology, evolution, genetics and molecular biology, this course examines the biology of man's culture and religion. Topics include coevolution of culture and gene systems; adaptive significance of religion; evolution, free-will and creative process; altruism; mysticism and states of consciousness. *Preq:* BIOL 103 and 104 or consent of instructor.

BIO SC 222 Human Anatomy and Physiology I 2(2,0) Basic introductory course in integrated human anatomy and physiology covering cells and tissues; integumentary, skeletal, muscular and nervous systems; sensory organs. Physiology is stressed. Structured primarily for nursing and other health related curricula. *Preq:* BIOL 103 or 110; CH 101 and 102 or 105 and 106. *Coreq:* BIO SC 224 or permission of instructor.

BIO SC 223 Human Anatomy and Physiology II 2(2,0) Continuation of BIO SC 222 covering endocrine, reproductive, cardiovascular, lymphatic, respiratory, urinary, digestive systems; fluid and electrolyte balance. Physiology is stressed. *Preq:* BIO SC 222 and 224 or permission of instructor. *Coreq:* BIO SC 225 or permission of instructor.

BIO SC 224 Human Anatomy and Physiology I Laboratory 2(1,2) A hands-on approach to the integrated study of human anatomy and physiology. Subjects covered are cells and tissues; integumentary, skeletal, muscular and nervous systems; sensory organs. Anatomy is stressed. Structured primarily for nursing and other health related curricula. *Preq:* BIOL 103 or 110; CH 101 and 102 or 105 and 106. *Coreq:* BIO SC 222 or permission of instructor.

BIO SC 225 Human Anatomy and Physiology II Laboratory 2(1,2) Continuation of BIO SC 224 covering endocrine, reproductive, cardiovascular, respiratory, digestive, urinary systems. Anatomy is stressed. *Preq:* BIO SC 222 and 224 or permission of instructor. *Coreq:* BIO SC 223 or permission of instructor.

BIO SC 302, H302 Invertebrate Biology 3(3,0) An in-depth survey and comparison of free-living invertebrate animals emphasizing functional anatomy, development and evolutionary relationships. *Preq:* An introductory two-semester biology sequence with laboratory. *Coreq:* BIO SC 306.

BIO SC 303, H303 Vertebrate Biology 3(3,0) Comprehensive survey of vertebrate animals including their taxonomy, morphology, evolution, and selected aspects of the natural history and behavior. *Preq:* An introductory two-semester biology sequence with laboratory.

- BIOSC 304, H304 Biology of Plants 3(3,0)** Survey of the major groups of plants, their biology, diversity, and evolution. *Preq:* BIOL 104 or 111 or BIOSC 205.
- BIOSC 305 Biology of Algae and Fungi 3(3,0)** Introduction to the biology of the major groups of algae and fungi. The course emphasizes how select representatives of the algae and fungi are adapted to their environment through structural, physiological and life-cycle modifications. *Preq:* BIOL 104 or 111 or BIOSC 205.
- BIOSC 306 Invertebrate Biology Laboratory 1(0,3)** Survey and comparison of the biology of living invertebrates, examples of which are drawn primarily from the southeastern coast of the United States. *Preq:* An introductory two-semester biology sequence with laboratory. *Coreq:* BIOSC 302.
- BIOSC 307 Vertebrate Biology Laboratory 1(0,3)** Comparative and phylogenetic study of the gross morphology of vertebrates. *Preq or Coreq:* BIOSC 303.
- BIOSC 308 Biology of Plants Practicum 1(0,3)** Laboratory exercises that explore the major groups of plants, their biology, diversity, and evolution. *Preq or Coreq:* BIOSC 304.
- BIOSC 309 Algae/Fungi Practicum 1(0,3)** Practice in the manipulation and examination of selected algae and fungi, with emphasis on culture techniques, and examination of the structure and adaptations of the algae and fungi to different environments. *Preq or Coreq:* BIOSC 305.
- BIOSC (W F B) 313 Conservation Biology 3(3,0)** See W F B 313.
- BIOSC 320 Field Botany 2(2,3)** Introductory study of the taxonomy, ecology, and evolutionary processes of plants native to South Carolina. Emphasis is on visits to many different habitats for observation and study of plant diversity. *Preq:* BIOL 104, 111 or BIOSC 205.
- BIOSC 335 Evolutionary Biology 3(3,0)** Introduction to the basic concepts and underlying principles of modern evolutionary biology. Topics include a historical overview of evolutionary theories, elementary population genetics, principles of adaptation, speciation, systematics and phylogenetic inference, fossil record, biogeography, molecular evolution, and human evolution. *Preq:* GEN 302 or equivalent.
- BIOSC 336, H336 Computers in Life Sciences 3(1,4)** The use of computers, video and communication technologies in the life sciences will be explored through demonstration, discussion and collaborative projects that will prepare students to use modern technology in research, learning, communicating and public presentation of biological principles and phenomena. *Preq:* BIOL 104 or 111 or permission of instructor.
- BIOSC 401, H401, 601 Plant Physiology 3(3,0)** The relations and processes which pertain to maintenance, growth, and reproduction of plants, including absorption of matter and energy, water relations of the plant, utilization of reserve products and liberation of energy. *Preq:* BIOL 104 or 111 or BIOSC 205 and CH 102 or 112. *Coreq:* BIOSC 402.
- BIOSC 402, 602 Plant Physiology Laboratory 1(0,3)** Laboratory exercises and experiments designed to indicate the relations and processes which pertain to maintenance, growth and reproduction of plants, including absorption of matter and energy, water relations of the plant, utilization of reserve products, and liberation of energy. *Coreq:* BIOSC 401.
- BIOSC 403, H403, 603 Protozoology 3(3,0)** Survey of the protozoa with emphasis on organization and function. Representative types of both free-living and parasitic forms will be examined for each major taxon. *Preq:* BIOL 104 or 111.
- BIOSC 404, H404, 604 Protozoology Laboratory 2(1,2)** Laboratory exercises will reinforce the material presented in BIOSC 403 and will introduce students to techniques used in collection, preservation, and examination of protozoans. *Coreq:* BIOSC 403.
- BIOSC 405, H405, 605 Molecular Genetics of Eukaryotes 3(3,0)** Molecular genetic analyses of eukaryotes in relation to mutations and repair, complex phenotypes, biochemical pathways, short- and long-term regulation of gene expression, and evolution. *Preq:* GEN 302 or equivalent and one semester of biochemistry, or consent of instructor.
- BIOSC 406, H406, 606 Introductory Plant Taxonomy 3(3,0)** Introduction to the basic principles and concepts of plant systematics with emphasis on the plants of South Carolina. *Preq:* BIOL 104 or 111 or BIOSC 205. *Coreq:* BIOSC 407.
- BIOSC 407, 607 Plant Taxonomy Laboratory 1(0,3)** Introduction to the basic techniques of plant taxonomy with laboratory and field emphasis on the flora of South Carolina. *Coreq:* BIOSC 406.
- BIOSC 408, H408, 608 Comparative Vertebrate Morphology 3(3,0)** Phylogeny and diversity of vertebrates and study of their comparative morphology, leading to an understanding of the relationships and functioning of living organisms. *Preq:* BIOL 104 or 111. *Coreq:* BIOSC 409.
- BIOSC 409, H409, 609 Comparative Vertebrate Morphology Laboratory 1(0,3)** Comparative anatomy of representative vertebrates. Methods used in preparing specimens for study and display. *Coreq:* BIOSC 408.
- BIOSC 410, 610 Limnology 3(3,0)** Detailed introduction to the physical, chemical, and biological interrelationships that characterize inland water environments. A fundamental approach to the interactions of components of the environment is developed at a theoretical level. *Preq:* Junior standing in a life science or consent of instructor.
- BIOSC 411, H411, 611 Limnological Analyses 2(1,2)** Examines a broad range of topics covered with both standing and running fresh waters. About one-third of the laboratory exercises address the major physical components of lakes and streams. The remainder provide rationale and methods for quantitative analyses of biota, as well as some integrated analyses of whole ecosystems. *Preq or Coreq:* BIOSC 410 or 443.
- BIOSC (GEN) 416, 616 Recombinant DNA 3(3,0)** See GEN 416.
- BIOSC (GEN, MICRO) 418, 618 Biotechnology I: Nucleic Acids Techniques 4(2,4)** Designed to provide basic training in the manipulation of genetic information using recombinant DNA technology. Included are techniques in molecular cloning, Southern and Northern analyses, clone library construction. *Preq:* BIOCH 210 or 301, MICRO 305 or consent of instructor.
- BIOSC 420, H420, 620 Neurobiology 3(3,0)** Designed to provide broad background in neurobiology. Topics include neuroanatomical structure-function; conduction in the neuron; neurite growth and development; neuromuscular junction; chemistry, physiology, and pharmacology of specific neurotransmitters and receptors; visual process; axoplasmic transport; hypothalamic-pituitary regulation; theories of behavior; theories of learning and memory. *Preq:* BIOCH 210 or 301 or consent of instructor.
- BIOSC 425, 625 Introductory Mycology 3(3,0)** Introduction to the biology of all the groups of fungi and some related organisms, with considerations of the taxonomy, morphology, development, physiology, and ecology of representative forms. *Preq:* BIOL 104 or 111 or BIOSC 205.
- BIOSC 426, 626 Mycology Practicum 2(1,2)** Application of the principles of mycological techniques, including isolation, culture, identification, and microscopic study of fungi. Examples from all major groups of fungi will be included. *Preq or Coreq:* BIOSC 425.
- BIOSC (AG E) 430, 630 Engineering Modeling of Biological Systems 3(3,0)** See AG E 430.
- BIOSC 432, H432, 632 Animal Histology 3(3,0)** A structural and functional study of the basic tissues of animals and tissue makeup of organs. Emphasis on light microscopy level with selected tissue studied at the electron microscope level. *Preq:* BIOSC 303 or consent of instructor. *Coreq:* BIOSC 433.
- BIOSC 433, H433, 633 Animal Histology Laboratory 2(1,2)** Microscopic examination of the basic animal tissue types and the tissue makeup of organs which comprise systems. *Coreq:* BIOSC 432.
- BIOSC 435, H435, 635 Principles of Evolution 4(4,0)** Introduction to the fundamental principles and major concepts of the evolutionary process in animals, including a consideration of evolutionary theories, adaptive processes in populations, and major evolutionary patterns and to the principles of classification and systematics. *Preq:* GEN 302 or consent of instructor.
- BIOSC 440, H440, 640 Developmental Animal Biology 3(3,0)** Events and mechanisms responsible for the development of multicellular animals. Gametogenesis, fertilization, embryonic development, cellular differentiation, morphogenesis, larval forms and metamorphosis, asexual reproduction, regeneration, malignancy, and aging will be analyzed in terms of fundamental concepts and control processes. *Preq:* BIOCH 210 or 301 or consent of instructor. *Coreq:* BIOSC 450.
- BIOSC 441, H441, 641 Ecology 3(3,0)** Study of basic ecological principles underlying the relationships between organisms and their biotic and abiotic environments. Includes physiological, population and community ecology, with applications of each to human ecological concerns. *Preq:* BIOL 104, 111 or BIOSC 205 or consent of instructor.

BIOSC 442, H442, 642 Biogeography 3(3,0) Study of patterns of distribution of plants and animals in space and time. *Preq:* BIOSC 302 or 303 or 304 or 305 or consent of instructor.

BIOSC 443, 643 Aquatic Ecology 3(3,0) Study of basic ecological principles and concepts as they apply to aquatic environments: rivers and streams, lakes and ponds, reservoirs, swamps, marshes, estuaries, and marine systems. *Preq:* Junior standing in a life science or consent of instructor.

BIOSC 445, H445, 645 Ecology Laboratory 2(1,2) Modern and classical approaches to the study of ecological problems discussed in BIOSC 441. Students will be introduced to field, laboratory and computer-based analyses of plant and animal populations and communities. *Preq or Coreq:* BIOSC 441.

BIOSC 446, H446, 646 Plant Ecology 3(3,0) Ecology of plants in relation to their biotic and abiotic environments. Individual organisms, populations, and communities will be considered with an emphasis on seed plants in terrestrial environments. *Preq:* BIOL 104, 111 or BIOSC 205 or consent of instructor.

BIOSC 447, H447, 647 Plant Ecology Laboratory 2(1,2) Experimental and observational approach to addressing principles discussed in BIOSC 446. Students will be introduced to field and laboratory methods involving individual organisms, populations, and communities. *Preq or Coreq:* BIOSC 446 or consent of instructor.

BIOSC 450, H450, 650 Developmental Biology Laboratory 2(1,2) Examines a broad range of topics concerned with the development of multicellular animals such as gametogenesis, fertilization, embryonic development, cell differentiation, morphogenesis, larval metamorphosis, and regeneration. Laboratory exercises will provide the rationale and methods for the descriptive and experimental analysis of development in representative invertebrates and vertebrates. *Preq or Coreq:* BIOSC 440 or equivalent.

BIOSC 452, 652 Plant Anatomy and Morphology 3(3,0) Studies of the anatomy, reproduction, and phylogenetic relationships of vascular plants. *Preq:* BIOL 104, 111 or BIOSC 205, or consent of instructor.

BIOSC 453, 653 Plant Anatomy and Morphology Laboratory 2(1,2) Laboratory focusing on the anatomy, reproduction, and phylogenetic relationships of vascular plants. *Coreq:* BIOSC 452.

BIOSC 456, H456, 656 Medical and Veterinary Parasitology 3(3,0) Introduction to parasitism in the animal kingdom with emphasis on both basic and applied principles as they relate to economically and medically important diseases. Classical and experimental approaches to the study of parasitism are examined in reference to protozoa, helminths, and arthropods. *Preq:* BIOL 104 or 111. *Coreq:* BIOSC 457.

BIOSC 457, H457, 657 Medical and Veterinary Parasitology Laboratory 2(1,2) Laboratory exercises will reinforce the material presented in BIOSC 456 and will introduce students to both live and preserved human/animal parasites. Students also will be introduced to techniques used in collection, preservation, and examination of animal parasites. *Coreq:* BIOSC 456.

BIOSC (AG E) 458, H458, 658 Cell Physiology 3(3,0) Study of the chemical and physical principles of cell function emphasizing bioenergetics and membrane phenomena. *Preq:* BIOCH 210 or 301 or consent of instructor.

BIOSC 459, H459, 659 Systems Physiology 3(3,0) Physiological systems of vertebrates and their homeostatic controls. Function of the major physiological systems is described in terms of anatomical structure and chemical and physical principles. *Preq:* One year each of biology, chemistry, and physics or consent of instructor.

BIOSC 460, H460, 660 Systems Physiology Laboratory 2(1,2) Modern and classical experimental methods will be used to demonstrate fundamental physiological principles discussed in BIOSC 459. Students will be introduced to computer-aided data acquisition and computer simulations of physiological function. *Preq or Coreq:* BIOSC 459.

BIOSC 461, H461, 661 Cell Biology 3(3,0) In-depth analysis of how and where intracellular and extracellular molecules control general and specific cellular functions such as gene expression, secretion, motility, signaling, cell-cycle control and differentiation. Taught and graded at a level where students are expected to infer from and integrate cellular events. *Preq:* BIOCH 301 or consent of instructor.

BIOSC 462, 662 Cell Biology Laboratory 2(1,2) Accompanies BIOSC 461. Focus on molecular and microscopic analysis of eukaryotic cells. *Coreq:* BIOSC 461.

BIOSC 464, 664 Mammalogy 3(2,3) Origin, evolution, distribution, structure, and function of mammals, with laboratory emphasis on the mammals of South Carolina. Field collection required. *Preq:* BIOSC 303 or consent of instructor.

BIOSC (HORT) 465, 665 Plant Molecular Biology 3(3,0) Study of fundamental plant processes at both the cellular and molecular levels. Topics will include genome structure and organization (both nuclear and organellar); regulation of gene expression and its role in cellular and whole-plant processes; transposable genetic elements; applications for biotechnology. *Preq:* Junior standing or consent of instructor; BIOSC 304 or 305 or 421 or GEN 302.

BIOSC 470, H470, 670 Animal Behavior 3(3,0) Historical and modern developments in animal behavior emphasizing the evolutionary and ecological determinants of behavior. A synthesis of ethology and comparative psychology. *Preq:* BIOSC 302 or 303 or consent of instructor.

BIOSC 471, 671 Animal Behavior Laboratory 1(0,3) Laboratory exercises that explore the behavior of animals. Emphasis is on behavioral observation and analysis and presentation of findings in a report format. *Preq or Coreq:* BIOSC 470 or consent of instructor.

BIOSC 475, H475, 675 Comparative Physiology 3(3,0) Physiological systems of invertebrates and vertebrates with emphasis on environmental adaptation. Physiological principles as they relate to metabolism, thermoregulation, osmoregulation, respiration, and neural and integrative physiology. *Preq:* One year each of biology, chemistry, and physics or consent of instructor.

BIOSC 476, H476, 676 Comparative Physiology Laboratory 2(1,2) Modern classical experimental methods will be used to demonstrate fundamental physiological principles discussed in BIOSC 475. Students will be introduced to computer-aided data acquisition and manipulation as well as computer simulations of physiological function. *Preq or Coreq:* BIOSC 475.

BIOSC 480, 680 Vertebrate Endocrinology 3(3,0) Introduction to the basic principles of neuro-endocrine integration and homeostatic maintenance in vertebrates. Comparative morphology and physiology of various endocrine tissues and hormone chemistry and modes of action are considered. *Preq:* BIOSC 303, organic chemistry, or consent of instructor.

BIOSC 491, H491 Special Problems in Biological Sciences 2-4(0,6-12) Research problems in selected areas of biological sciences to provide an introduction to research planning and techniques. May be taken for a maximum of eight credits. *Preq:* Junior or Senior standing or consent of instructor.

BIOSC 493 Senior Seminar 2(2,0) Analysis and discussion of papers from the primary literature of the biological sciences. Students will search the primary literature, present and analyze selected readings. *Preq:* Senior standing and either ENGL 314 or SPCH 250 or consent of instructor.

BIOLOGY

Professor: D. R. Helms; *Associate Professors:* J. L. Dickey, R. A. Garcia, R. J. Kosinski, C. K. Revis-Wagner, A. D. Smith, W. M. Surver, *Chair:* J. A. Waldvogel; *Assistant Professor:* M. V. Ruppert; *Lecturer:* J. R. Cummings

BIOL 103, H103 General Biology I 4(3,3)¹ The first course in a two-semester sequence on the fundamentals of biology. Lecture and laboratory emphasize the structural, molecular, and energetic basis of cellular activities, fundamentals of genetic variability, reproductive strategies of organisms, and scientific processes. Diversity of animals and principles of evolution are introduced.

BIOL 104, H104 General Biology II 4(3,3)¹ Continuation of BIOL 103, emphasizing animals and plants as functional units, evolution and diversity of plants, and principles of evolution and ecology. *Preq:* BIOL 103.

BIOL 109 Introduction to Life Science 4(3,3) Survey of topics in botany, zoology, microbiology and ecology emphasizing comprehension and practical application of life-science concepts to experiments and activities appropriate for the elementary school classroom. Enrollment preference given to Early Childhood and Elementary Education majors.

BIOL 110 Principles of Biology I 5(4,3)¹ Introductory course designed for students majoring in biological disciplines of the College of Sciences. The course integrates lecture and laboratory and emphasizes a modern, quantitative, and experimental approach to explanations of structure, composition, dynamics, interactions, and evolution of cells and organisms. High school chemistry is recommended. *Coreq:* CH 101.

BIOL 111 Principles of Biology II 5(4,3) Continuation of BIOL 110 that emphasizes the study of plants and animals as functional organisms and the principles of ecology. *Prq:* BIOL 110.

*Credit toward a degree will be given for only one combination of the following: BIOL 110 or 103 followed by BIOL 111 or 104 dependent on the requirements for the major.

BOTANY

BOT 413, 613 Phycology 4(3,3) Introduction to the biology of algae. Consideration is given to the structure, classification, evolution, natural history, physiology, and ecology of all algal groups. Laboratory includes experimentation, collection, and identification of both freshwater and marine algae, and field trip to the Florida Keys over the spring break. *Prq:* BIOL 104 or 111 or BIOSC 205/206.

CALHOUN HONORS SEMINAR

C H S H101 Structures and Society 3(3,0) Interdisciplinary, communications-intensive honors seminar examining selected structures regarded as monuments to artistic creativity and technological genius, and the ways that structures affect and are affected by the societies that produce them. *Prq:* Membership in Calhoun College.

C H S H102 Science, Culture and Human Values 3(3,0) Seminar that by adopting an interdisciplinary perspective, unifies natural scientific, social scientific, and humanistic disciplines into a holistic view of the modern world and its future. *Prq:* Membership in Calhoun College.

C H S H103 Society, Art and Humanities 3(3,0) Combines readings and methodologies from the social sciences, arts, and humanities to study the interrelationships among the disciplines and their societal effects. The subject of the study will vary. May be repeated for a maximum of six credits, but only if different topics are covered. *Prq:* Membership in Calhoun College and consent of instructor.

C H S H104 Honors Study/Travel 1(0,3) Study/travel experience related to a three credit Calhoun Honors Seminar. May be repeated for a maximum of three credits, but only if different topics are covered. *Prq:* Membership in Calhoun College and consent of instructor.

CERAMIC ENGINEERING

Professors: D. A. Brosnan, R. J. Diefendorf, C. C. Fain, G. H. Haertling, G. Lewis, H. J. Rack; *Associate Professors:* D. R. Dinger, B. I. Lee, H. D. Leigh III, *Chair:* E. C. Skaar, T. D. Taylor

CR E 201 Introduction to Ceramic Engineering 3(3,0) Introduction to the history of the industrial segments of the ceramic industry. Classification of the industry based on product lines and raw materials used. Examination of crystal chemistry, occurrence, winning and preparation of raw materials prior to processing into ware. *Prq:* CH 101.

CR E 202 Processing Ceramic Raw Materials into Products 3(3,0) Study of the manufacturing of ceramic products from the point of view of clay-

silicate raw materials characterization and preparation, mixing for quality, the characteristics of mixtures throughout the manufacturing sequences, and the study of forming procedures to obtain quality products. *Prq:* CH 101.

CR E 204 Laboratory Procedures 3(1,4) Introduction to ceramic laboratory procedures. Use of basic ceramic engineering machinery, testing equipment, and processes, e.g., dry pressing, slip casting, plaster-mold making, firing, glazing, and mechanical properties measurements. *Prq:* CH 101, MTHSC 106. *Coreq:* CH 102, MTHSC 108.

CR E 205 Introduction to Ceramic Engineering Calculations 3(2,2) This course will provide the ceramic engineering student with basic tools and skills to use electronic spreadsheets to solve calculations-intensive engineering problems in processing or testing. Spreadsheet templates and reports prepared on word processing software will be exchanged via e-mail.

CR E 210 Introduction to Materials Science 3(3,0) A beginning course in materials science designed primarily for engineering students. Study of the relation between the electrical, mechanical, and thermal properties of products and the structure and composition of these products. All levels of structure are considered from gross structure easily visible to the eye through electronic structure of atoms. *Prq:* CH 101, MTHSC 106.

CR E 302 Thermo-Chemical Ceramics 3(3,0) High-temperature equilibrium using the laws of physical chemistry as applied to ceramic systems in both solid and liquid states. An introduction to the crystal chemistry of ceramic raw materials, and the effect of crystalline form on their high-temperature behavior.

CR E 304 Experimental Design 3(1,4) A Junior-level laboratory course designed to expose the student to statistically-designed experimental techniques to solve ceramic engineering problems typically encountered in processing, testing, and manufacturing ceramic materials. *Prq:* CR E 201, 202, 204.

CR E 307 Thermal Processing of Ceramics 2(2,0) The accomplishment of changes in structure and composition through the application of thermal energy. The course includes a study of simultaneous transfer of heat and mass, fluid flow, determinants of rates in a variety of reactions and calculations of the energy requirements to accomplish change in structure or composition. *Coreq:* CR E 308.

CR E 308 Thermal Processing of Ceramics Laboratory 1(0,2) Laboratory experimentation to accomplish changes in structure and composition through the application of thermal energy. *Coreq:* CR E 307.

CR E 309 Research Methods 2(0,6) The planning and solution of selected research problems. *Prq:* CR E 304.

CR E 311 Kinetics of Materials Processes 3(3,0) Study of the kinetics of solid-solid, solid-liquid and solid-gaseous reaction as they apply to materials system, energy transport as applied to materials processing and the importance of these phenomena to manufacturing and design of materials. *Prq:* CH 331.

CR E 317 Industrial Fuels and Combustion 2(2,0) Study of the application of burners, fuels, and control equipment to industrial kilns and furnaces. Emphasis will be given to current industrial equipment and practices. Topics include fuel chemistry, combustion analysis, ratio-control systems, flow and pressure measurement and control, burners, flames and heat transfer. *Prq:* CH 102. *Coreq:* CR E 318.

CR E 318 Combustion Laboratory 1(0,2) Study of burner control equipment and control methodologies. Emphasis will be placed on developing confidence in each student concerning the safe operation of industrial burners. Students will learn about burner control equipment and techniques for adjusting air/fuel ratios and for controlling a variety of industrial burners. *Prq:* CH 102. *Coreq:* CR E 317.

CR E 402, H402, 602 Solid State Ceramics 3(3,0) The effects of the composition, form and source of raw materials on the manufacturing processes and final properties of ceramics. Included are fundamental studies of phenomena such as diffusion, sintering, phase transformation, stability, and micro-structural development. Property measurement and analytical methods for characterization are discussed. *Prq:* CR E 301, 311, MTHSC 208.

CR E 403, H403, 603 Glasses 3(3,0) Glass structure and composition and their relation to the properties of glasses. Consideration is given to the processing variables which control the properties of glasses including glass products, enamels, glazes, and vitreous bonds.

CR E 404, 604 Ceramic Coatings 3(3,0) The raw materials, methods of manufacture, and properties of ceramic coating. *Prq:* CR E 302.

CR E 406 Ceramic Project 2(0,6) The completion of an original research into a ceramic problem. May be repeated for a maximum of four credits. *Prq:* CR E 302.

CR E 407 Senior Design Project 3(1,4) Course designed to give the student real ceramic engineering experience. Students will participate with an industrial partner in the solution of design engineering problems. *Prq:* CR E 304 and Senior standing in Ceramic Engineering.

CR E 410, 610 Analytical Processes 3(2,3) Introductory course on the theory and use of X-ray diffraction and spectroscopic methods. *Prq:* Junior standing.

CR E 414, 614 Processing of Ceramics 3(3,0) Course covers ceramic processing after the raw material preparation with emphasis on modern processing theories and practices. Topics include nature of particles, forming methods, characterization techniques, consolidation by heat, surface chemistry of solids, and chemical processing of specialized ceramics and composites. *Prq:* CH 102 or equivalent.

CR E 416, 616 Electronic Ceramics 3(3,0) Theory and measurement of the electronic properties of ceramic products.

CR E 418, 618 Process Control 3(3,0) Process control techniques and apparatus with particular emphasis on temperature measurement and control systems. The application of laboratory techniques to the control of product quality and process efficiency is included. *Prq:* Junior standing.

CR E 419, H419, 619 Science of Engineering Materials 3(3,0) Course planned to acquaint engineers with thermal, electrical, and chemical characteristics of engineering materials. Emphasizes fundamental consideration of the structure of matter in the solid and glassy states, solid-state reactions, and influence of particle and aggregate structure to speed of reactions and product properties. *Preq:* CH 112, MTHSC 108, PHYS 122.

CR E 420, 620 Science of Engineering Materials 3(3,0) Continuation of CR E 419 with emphasis on application of fundamentals in nuclear reactors and nuclear power plants. Consideration is given to the development of ceramics for fuel elements, moderator materials, control rods, shielding and radioactive waste disposal.

CR E 430, 630 Fine Particle Processing in Ceramic Systems 3(3,0) A study of the cause-and-effect relationship in particulate suspensions controlling rheological behavior, porosity, packing densities, shrinkage, and other properties of ceramic ware. Subjects covered will include particle size analysis techniques and measurements, particle packing, rheological properties and measurements, surface area analysis, and interfacial chemicals including both flocculants and deflocculants. *Preq:* CR E 202, 204, 304 or consent of instructor.

CR E 450 Safety and Environmental Concerns in Ceramic Manufacturing 3(3,0) Introductory course on safety and environmental regulations applied to ceramic manufacturing. Ceramic materials are examined with respect to potentially hazardous constituents. Effluents from ceramic manufacturing are examined. Current legislation, including application of the Clean Air Act, is reviewed. Recycling strategies with ceramic technology are examined. *Preq:* CR E 302, 307.

CR E 451 3(2,2) Brittle Material Design 3(2,2) Introduction to the mechanical properties of brittle materials and the use of Weibull statistics and finite element analysis to design with brittle materials. *Preq:* Junior standing.

CR E 490, H490, 690 Special Topics in Ceramic Engineering 1-3(1-3,0) Study of topics not ordinarily covered by other courses. Taught as the need arises. Typical topics could include current research in a specific area or technological advances. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

CHEMICAL ENGINEERING

Professors: C. H. Barron, Jr., J. N. Beard, D. D. Edie, Chair; C. H. Gooding, J. M. Haile, S. S. Melshimer; *Associate Professors:* A. A. Ogale, R. W. Rice, M. C. Thies; *Assistant Professors:* D. A. Bruce, D. E. Hirt

CH E 201 Introduction to Chemical Engineering 3(2,2) Introduction to fundamental concepts of chemical engineering, including mass and energy balances, PVT relations for gases and vapors, and elementary phase equilibria. *Preq:* CH 112 (preferred) or CH 102, ENGR 180 and PHYS 122.

CH E 211 Introduction to Chemical Engineering 4(3,2) Introduction to fundamental concepts of chemical engineering, including mass and energy balances, PVT relationships for gases and

vapors, and elementary phase equilibria; problem solving and computer skills are developed in lab. *Preq:* CH 102 or 112 (preferred); ENGR 120, PHYS 122.

CH E 220 Chemical Engineering Thermodynamics I 3(3,0) Topics include first and second laws of thermodynamics, ideal gases, PVT properties of real fluids, energy balances with chemical reactions, and thermodynamic properties of real fluids. *Preq:* CH E 201 and MTHSC 206.

CH E 252 Process Modeling and Numerical Methods 2(2,0) Course will introduce students to some concepts of chemical process modeling and the use of numerical methods for solution of typical chemical engineering problems. Digital computational techniques for the numerical methods will use a specific procedure-oriented language such as FORTRAN. *Preq:* CH E 201. *Coreq:* MTHSC 208.

CH E 301 Unit Operations I 3(3,0) General principles of chemical engineering and study of the following unit operations: fluid flow, fluid transportation, and heat transmission. Special emphasis is placed on theory and its practical application to design. *Preq:* CH E 201, MTHSC 206. *Coreq:* CH E 252.

CH E 302 Unit Operations II 3(3,0) Study of evaporation and selected unit operations based on diffusional phenomena. Primary attention will be given to differential contact operations such as absorption, humidification and gas-liquid contact. *Preq:* CH E 220, 252, 301.

CH E 306 Unit Operations Laboratory I 2(1,3) Laboratory work in the unit operations of fluid flow, heat transfer, and evaporation. Stress is laid on the relation between theory and experimental results and the statistical interpretation of those results and on report writing. *Preq:* CH E 301, E G 209. *Coreq:* EX ST 411 or MTHSC 302.

CH E 307 Unit Operations Laboratory I 3(2,3) Laboratory work in the unit operations of fluid flow, heat transfer, and evaporation. Stress is laid on the relation between theory and experimental results and the statistical interpretation of those results and on report preparation and presentation. *Preq:* CH E 311, E G 209. *Coreq:* EX ST 411 or MTHSC 302.

CH E 311 Fluid Flow 3(3,0) Fundamentals of fluid flow and the application of theory to chemical engineering unit operations, such as pumps, compressors, and fluidization. *Preq:* CH E 211, MTHSC 206.

CH E 312 Heat and Mass Transfer 3(3,0) Study of the basics of heat transmission and mass transport. Special emphasis will be placed on theory and its application to design. *Preq:* CH E 220, 311.

CH E 319 Engineering Materials 3(3,0) Introduction to the fundamental properties and behavior of engineering materials. Emphasis will be placed on polymers, metals, ceramics, and composite materials. *Preq:* CH E 223, CH E 220, E M 201.

CH E 321, H321 Chemical Engineering Thermodynamics II 3(3,0) Continuation of CH E 220. Topics include thermodynamics of power cycles and refrigeration/liquefaction, thermodynamic properties of homogeneous mixtures, phase equilibria, and chemical reaction equilibria. *Preq:* CH 331, CH E 220, 252, MTHSC 208.

CH E 353, H353 Process Dynamics and Control 3(3,0) Mathematical analysis of the dynamic response of process systems. Basic automatic control theory, and design of control systems for process applications. *Preq:* CH E 252, 301, and MTHSC 208.

CH E 401, H401, 601 Transport Phenomena 3(3,0) Mathematical analysis of single and multi-dimensional steady-state and transient problems in momentum, energy, and mass transfer. Both the similarities and differences in these mechanisms are stressed. *Preq:* CH E 302 and MTHSC 208.

CH E 403, H403 Unit Operations III 3(3,0) Study of liquid-liquid extraction, distillation, and other unit operations. *Preq:* CH E 302, 321 and CH 332.

CH E 407 Unit Operations Laboratory II 3(1,6) Continuation of CH E 306 with experiments primarily on the diffusional operations. Additional lecture material on report writing and general techniques for experimental measurements and analysis of data, including statistical design of experiments. *Preq:* CH E 302, 306, 353.

CH E 412, 612 Polymer Engineering 3(3,0) Design-oriented course in synthetic polymers. Topics include reactor design used in polymer production, effect of step versus addition kinetics on reactor design, epoxy curing reactions, polymer solubility, influence of polymerization and processing conditions on polymer crystallinity. *Preq:* CH 224 and 332 or consent of instructor.

CH E 413 Separation Processes 3(3,0) Study of gas-liquid and liquid-liquid separation techniques with emphasis on gas absorption, distillation, and liquid-liquid extraction. *Preq:* CH 332, CH E 312, 321.

CH E (AG E) 428, 628 Biochemical Engineering 3(3,0) Use of microorganisms and enzymes for the production of chemical feedstocks, single-cell protein, antibiotics, and other fermentation products. Topics include kinetics and energetics of microbial metabolism, design and analysis of reactors for microbial growth and enzymecatalyzed reactions, and considerations of scale-up, mass transfer, and sterilization during reactor design. *Preq:* Agricultural Engineering majors take AG E (BIOSC) 430 and MICRO 305, BIOCH 301; Chemical Engineering majors take CH E 302 as prerequisite and CH E 450 as corequisite.

CH E 431 Process Development, Design, and Optimization of Chemical Engineering Systems I 3(2,3) Study of the steps in creating a chemical process design from the original concept to successful completion and operation of the plant. Topics include engineering economics, systems and analysis, simulation, optimization, process-equipment sizing, selection, and costing. *Preq:* CH E 252, 302, 306. *Coreq:* CH E 403.

CH E 432 Process Development, Design, and Optimization of Chemical Engineering Systems II 5(1,12) Continuation of CH E 431. The principles of process development, design, and optimization are applied in a comprehensive problem carried from a general statement of the problem to detailed design and economic evaluations. *Preq:* CH E 321, 353, 403, 407, 431, and 450 or consent of department chair.

CH E 443 Chemical Engineering Senior Seminar 1 I(1,0) Topics covered include oral communications, job interviewing skills, professionalism and professional ethics, and chemical engineering job functions in various industries. Oral presentations are given by students, and invited speakers from the profession discuss issues of current interest. To be taken Pass/Fail only. *Preq:* CH E 302, SPCH 250. *Coreq:* CH E 431.

CH E 444 Chemical Engineering Senior Seminar II 1 I(1,0) Continuation of CH E 443. To be taken Pass/Fail only. *Preq:* CH E 443. *Coreq:* CH E 432.

CH E 450, H450, 650 Chemical Reaction Engineering 3(3,0) Review of kinetics of chemical reactions, and an introduction to the analysis and design of chemical reactors. Topics include homogeneous and heterogeneous reactions, batch and continuous flow reaction systems, catalysis, and design of industrial reactors. *Preq:* CH E 302, 321, and CH 332.

CH E 454, 654 Computer Process Control 3(3,0) Introduction to digital computer control as applied in the chemical process industries. Topics include dynamics of process systems, control computer hardware and software, sampled data mathematics, digital control algorithms, process identification, and advanced control techniques. *Preq:* CH E 353 or equivalent and E C E 307, MTHSC 208.

CH E 491, H491 Special Projects in Chemical Engineering 1-3(1-3,0) As a need arises, special topics requested by students or offered by the faculty will be taught. Review of current research in an area, technological advances, and national engineering goals are possible topic areas. May be repeated for a maximum of six credits, but only if different topics are covered.

CHEMISTRY

Professors: R. A. Abramovitch, A. L. Beyerlein, *Chair*; D. D. DesMarteau, R. K. Dieter, I. D. Eubanks, J. W. Huffman, J. W. Kolis, H. G. Spencer, T. G. Tissue; *Associate Professors:* J. R. Appling, M. M. Cooper, A. L. Kholodenko, R. K. Marcus, R. R. Williams; *Assistant Professors:* J. D. Beckerle, S. E. Creager, S.-J. Hwu, G. B. Jones, W. T. Pennington, Y.-P. Sun; *Lecturers:* L. T. Eubanks, A. Kitaygorodsky; *Visiting Associate Professor:* C. W. Martin; *Visiting Assistant Professors:* R. C. Bauer II, M. D. Dillingham, J. D. Leyba

CH 101, H101 General Chemistry 4(3,3) Students are introduced to the elementary concepts of chemistry through classroom and laboratory experience. The course emphasizes chemical reactions and the use of symbolic representation, the mole concept and its applications and molecular structure. *Preq/Coreq:* MTHSC 105 or higher placement in MTHSC.

CH 102, H102 General Chemistry 4(3,3)¹ Continuation of CH 101, treating solutions, rates of reactions, chemical equilibrium, electrochemistry, chemistry of selected elements, and an introduction to organic chemistry. For students taking one year of chemistry or continuing in CH 201. *Preq:* C or better in CH 101.

CH 105 Beginning General and Organic Chemistry 4(3,3) Elementary treatment of principles of general and organic chemistry for students in liberal arts, education, business, health science, and selected life-science curricula. The laboratory is coordinated with the lecture. (Credits toward a degree given for only one of CH 101 and 105.) *Preq:* May not be taken as a prerequisite for organic chemistry.

CH 106 Beginning General and Organic Chemistry 4(3,3) Continuation of CH 105. Topics in elementary organic chemistry with an emphasis on organic chemistry relevant to life processes are developed in both lecture and laboratory. (Credit towards a degree will be given for only one of the following: CH 106, 102, or 112.) May not be taken as a prerequisite for organic chemistry. *Preq:* C or better in CH 105, or consent of instructor.

CH 112, H112 General Chemistry 4(3,3)¹ Continuation of CH 101 which emphasizes solutions, thermodynamic concepts, kinetics and oxidation-reduction reactions. The laboratory emphasizes solution chemistry and qualitative analyses. Recommended for students continuing in CH 223. *Preq:* CH 101.

CH 141 Chemistry Orientation 1(1,0) Lectures, discussions, and demonstrations devoted to health and safety in the chemistry laboratories; use of the chemical literature; and career planning. *Preq:* Registration in CH 101.

CH 201 Survey of Organic Chemistry 4(3,3)² Introduction to organic chemistry emphasizing nomenclature, classes of organic compounds, chemistry of functional groups. For students needing a one-semester course in organic chemistry. *Preq:* CH 102 or consent of instructor.

CH 205 Introduction to Inorganic Chemistry 2(2,0) One semester treatment which emphasizes the properties and reactions of the more common chemical elements. *Preq/Coreq:* CH 102.

CH 223 Organic Chemistry 3(3,0)² Introductory course covering the principles of organic chemistry and the derivation of these principles from a study of the properties, preparations, and interrelationships of the important classes of organic compounds. *Preq:* CH 102 or consent of instructor.

CH 224 Organic Chemistry 3(3,0) Continuation of CH 223. *Preq:* CH 223.

CH 225 Organic Chemistry Laboratory 2(0,6)³ The laboratory techniques involved in the synthesis, separation and purification, and characterization of typical examples of the classes of organic compounds. *Preq:* Registration in CH 223.

CH 226 Organic Chemistry Laboratory 2(0,6)⁴ Continuation of CH 225. *Preq:* Registration in CH 224.

CH 227 Organic Chemistry Laboratory 1(0,3)³ The synthesis and properties of typical examples of the classes of organic compounds. *Preq:* Registration in CH 223.

CH 228 Organic Chemistry Laboratory 1(0,3)⁴ Continuation of CH 227. *Preq:* CH 227 and registration in CH 224.

CH 229 Organic Chemistry Laboratory 1(0,3)³ A one-semester laboratory for chemical engineering students. *Preq:* CH 223.

CH 313 Quantitative Analysis 3(3,0) The fundamental principles of volumetric, gravimetric and certain elementary instrumental chemical analyses. *Preq:* Concurrent enrollment for credit in CH 315 or 317.

CH 315 Quantitative Analysis Laboratory 2(0,6)³ Laboratory techniques of volumetric, gravimetric, and elementary instrumental chemical analyses. *Coreq:* Concurrent enrollment for credit in CH 313.

CH 317 Quantitative Analysis Laboratory 1(0,3)³ The standard techniques of analytical chemistry—gravimetric, volumetric, and instrumental. *Coreq:* Concurrent enrollment for credit in CH 313.

CH 330 Introduction to Physical Chemistry 3(3,0)⁴ A one-semester treatment of physical chemistry which emphasizes topics that are especially useful in the life sciences, agriculture and medicine: chemical thermodynamics, equilibrium, solutions, kinetics, electrochemistry, macromolecules, and surface phenomena. *Preq:* MTHSC 106.

CH 331, 631 Physical Chemistry 3(3,0)³ Includes the gaseous state, thermodynamics, chemical equilibria, and atomic and molecular structure, from both experimental and theoretical points of view. *Preq:* MTHSC 206, PHYS 221.

CH 332, H332, 632 Physical Chemistry 3(3,0) Continuation of CH 331, including chemical kinetics, liquid and solid state, phase equilibria, solutions, electrochemistry and surfaces. *Preq:* CH 331 or consent of instructor.

CH 339, 639 Physical Chemistry Laboratory 1(0,3) Experiments are selected to be of maximum value to Chemistry and Chemical Engineering majors. *Coreq:* CH 331 or CH E 220.

CH 340, 640 Physical Chemistry Laboratory 1(0,3) Continuation of CH 339. *Preq:* Registration in CH 332.

CH 402, H402, 602 Inorganic Chemistry 3(3,0) Basic principles of inorganic chemistry are discussed with special emphasis on atomic structure, chemical bonding, solid state, coordination chemistry, organometallic chemistry and acid-base theories. The chemistry of certain selected elements is treated. *Preq:* CH 331, 332.

CH 411, 611 Instrumental Analysis 3(3,0) Theory and operation of modern optical and electronic instruments as they apply to processes of analytical, physical, and organic chemistry. *Preq:* CH 224.

CH 412 Instrumental Analysis Laboratory 2(0,6) Reinforcement of principles of chemical instrumentation described in CH 411/611 by practical, hands-on experience. Aspects of sample preparation, standardization, data acquisition and interpretation, and report formulation procedures common in chemical analyses are considered for a range of modern instrumental methods. *Coreq:* CH 411.

CH 413, H413 Chemistry of Aqueous Systems 3(3,0) Chemical equilibria in aqueous systems, especially natural waters; acids and bases, dissolved CO₂, precipitation and dissolution, oxidation-reduction, adsorption, etc. *Preq:* CH 102 or 106.

CH 421, H421, 621 Advanced Organic Chemistry 3(3,0) Survey of modern organic chemistry with an emphasis on synthesis and mechanisms. *Preq:* CH 224, 332, or equivalent.

CH 427, H427, 627 Organic Spectroscopy 3(2,3) Survey of modern spectroscopic techniques used in the determination of molecular structure. Emphasis is on the interpretation of spectra: nuclear magnetic resonance, ultraviolet, infrared, mass spectroscopy, optical rotatory dispersion and circular dichroism. *Preq:* One year each of organic chemistry and physical chemistry.

CH 435, 635 Atomic and Molecular Structure 3(3,0) Provides an introduction to quantum theory and its application to atomic and molecular systems. Topics include harmonic oscillator, hydrogen atom, atomic and molecular orbital methods, vector model of the atom, atomic spectroscopy, and molecular spectroscopy. *Preq:* CH 332 or consent of instructor.

CH 443 Research Problems 3(0,9) Original investigation of an assigned problem in a fundamental branch of chemistry. This work must be carried out under the supervision of a member of the staff. *Preq:* Senior standing in Chemistry or consent of instructor.

CH 444 Research Problems 3(0,9) Continuation of CH 443.

¹Credit toward a degree will be given for only one of the following: CH 102 or 112.

²Credit toward a degree will be given for only one of the following: CH 201 or 223.

³Credit toward a degree will be given for only one of the following: CH 225, 227, or 229.

⁴Credit toward a degree will be given for only one of the following: CH 226 or 228.

⁵Credit toward a degree will be given for only one of the following: CH 315 or 317.

⁶Credit toward a degree will be given for only one of the following: CH 330 or 331.

CIVIL ENGINEERING

Professors: S. C. Anand, N. M. Aziz, L. C. Bell, R. H. Brown, *Chair*; J. L. Burati, J. E. Clark, C. H. Juang, J. K. Nelson, R. F. Nowack, B. L. Sill, P. R. Sparks; *Associate Professors:* S. Amirkhanian, W. Baron, E. J. Hayter, S. R. Sanders, S. D. Schiff; *Assistant Professors:* T. A. Reinhold, D. V. Rosowsky, P. A. Work; *Lecturers:* L. O. Drew, W. F. Eskridge

C E 201 Surveying 3(2,3) Elementary plane surveying for civil engineering and other students whose curriculum requires a basic knowledge of surveying. Coverage includes measurement of distance, angles and elevations, stadia, topography, area and volume calculations, construction surveying. Field exercises provide practice in the use of surveying instruments. *Preq:* MTHSC 106.

C E 220 Mechanics of Materials in Civil Engineering 3(3,0) Builds on E M 201 to develop relationships between external loads on structural elements of civil engineering interest and the resulting internal loads and deformations. Students are exposed to the development of stress and deformation formulas as well as the identification and use of significant mechanical properties of civil engineering materials. *Preq:* E M 201.

C E 250 Creative Problem Solving I 2(1,3) Methods used in defining problems, generating and selecting alternatives, evaluating solutions; historical creativity, free thinking and characteristics of effective problem solvers. *Preq:* ENGR 120 and sophomore standing.

C E 251 Analysis Techniques in Civil Engineering 3(2,3) [C.1] Solution to civil engineering problems using the techniques of dimensional analysis, data analysis and numerical analyses. The latter includes introduction to FORTRAN programming, simulation analysis, and the numerical solution of systems of linear algebraic equations. *Preq:* ENGR 120. *Coreq:* C E 250, MTHSC 206.

C E 253 Civil Engineering Measurements 3(2,3) Coverage includes measurement of distance, angles and elevations with applications to area, topography volumetric computations, data acquisition, data processing, sensors, and instruments. Lab sessions include use of basic surveying instruments, introduction to Global Position Satellite Systems (GPS), and use of data acquisition systems. *Preq:* C E 251, E G 209.

C E 254 Strength of Materials 4(3,3) Builds on statics to develop relationships between external loads on structural elements of civil engineering interest and the resulting internal loads and deformations. Students are exposed to the development of stress and deformation formulas and the identification and use of significant mechanical properties of civil engineering materials. *Preq:* E M 201.

C E 300 Structural Systems Design 3(3,0) Introduction to the structural design process including a brief history of structural engineering, structural requirements, structural systems and materials, specification of loads and the preliminary design and costing of structural components and systems. *Preq:* C E 254. *Coreq:* C E 253.

C E 301, H301 Structural Analysis 3(3,0) Analysis of statically determinate structural elements and systems. Influence lines for beams and trusses. Calculation of rotations and deflections by moment area, conjugate beam and unit load methods. Moment distribution and introduction to other methods of indeterminate analysis. Use of microcomputers for the analysis of trusses, continuous beams, and frames. *Preq:* E M 304 or C E 220; *Coreq:* C E 305.

C E 302, H302 Structural Steel Design 3(3,0) Design of steel tension members, beams, beam-columns, and bolted, riveted and welded connections using load and resistance factor design methodology. Emphasis is on LRFD-AISC specifications for steel design. *Preq:* C E 301.

C E 305 Analysis Techniques in Civil Engineering 3(2,3) Solution to civil engineering problems using the techniques of dimensional analysis, data analysis and numerical analyses. The latter includes FORTRAN programming, simulation analysis, and the numerical solution of roots of equations and systems of linear algebraic equations. *Preq:* ENGR 180. *Coreq:* MTHSC 208.

C E 310 Transportation Engineering 4(3,2) Planning, location, design, operations, and administration of highways, railroads, airports and other transportation facilities, including economic considerations, pavement design, and computer applications. *Preq:* C E 201 and EX ST 301.

C E 311 Transportation Engineering Planning and Design 3(3,0) Planning, design and operation of transportation facilities including highways and airports. Coverage includes economic, safety and environmental considerations. Public transit systems are covered. *Preq:* MTHSC 302 or EX ST 301 and C E 253.

C E 320 Introduction to Construction Materials 3(2,3) Basic properties of portland cement and bituminous asphalt. Classification of aggregates on the basis of strength and size distribution. Mix design procedures, field control, and adjustments. Properties of fresh mixes and hardened concrete. Behavior of other construction materials including metals, composites, and plastics. Field trips to nearby plants. *Preq:* E M 305. *Coreq:* EX ST 301.

C E 321 Geotechnical Engineering 4(3,3) Mechanical and physical properties of soils and their relation to soil action in problems of engineering, such as classification, permeability, shearing strength, and consolidation: design of embankments and retaining walls with geotextiles. *Preq:* C E 251 and C E 254.

C E 324 Introduction to Construction Engineering 3(3,0) Construction contracts, technical specifications, cost estimating and competitive bid process, construction methods and equipment, cost control, project scheduling, materials management, labor relations, project safety, and innovative technologies. *Preq:* Junior standing.

C E 330 Soil Mechanics 4(3,3) Mechanical and physical properties of soils and their relation to soil action in problems of engineering, such as classification, permeability, shearing strength, consolidation, stress distribution and failure analysis of soils. *Preq:* E M 304 or C E 220 and Junior standing.

C E 331 Construction Engineering and Management 3(3,0) Construction contracts, technical specifications, cost estimating, project scheduling, cost control, materials management, quality control and quality assurance. *Preq:* Junior standing.

C E 340 Fluid Mechanics for Civil Engineers 3(3,0) Provides Civil Engineering students with an introduction to fluid mechanics, including properties and static and dynamic situations. Problem-solving skills are emphasized, including the principles of mass momentum and energy conservation. Special topics include conduit and open channel flows as well as simple pipe networks and pump systems. *Preq:* E M 202.

C E 341 Introduction to Fluid Mechanics 4(3,3) Provides students with an introduction to fluid mechanics, including properties of static and dynamic situations. Problem-solving skills are emphasized, including the principles of mass, momentum and energy conservation. Special topics include conduit flows and pump systems. Laboratory experiments are designed to familiarize students with laboratory techniques and instrumentation. *Preq:* E M 202 and Junior standing.

C E 342 Applied Hydraulics and Hydrology 3(3,0) Concepts covered are pipe network design, precipitation, evapotranspiration, runoff, hydrograph analysis, flood routing, hydrologic design, open channel flow, design of stable channels, and groundwater hydraulics. A design project involving hydrologic system analysis and design is assigned. *Preq:* C E 341.

C E 350 Economic Evaluation of Projects 3(3,0) Comparison of design alternatives based on engineering economic analysis. Introduction of present worth, annual worth, rate of return, and benefit-cost ratio methods. Use of depreciation and taxation in project analysis. Examines sensitivity and inflation effects. *Preq:* Junior standing.

- CE 351 Civil Engineering Materials 3(2,3)** Basic properties of aggregates, portland cement, and asphalt cement. Classification of aggregates on the basis of size and strength. Properties of portland cement and asphalt concrete mixtures, mix design procedures, field control and adjustments. Properties of steel and wood. Field trips to nearby plants. *Preq:* MTHSC 302 or EX ST 301. *Coreq:* CE 254.
- CE H388 Honors Presentation Skills 1(0,2)** Delivering and organizing effective presentations, use of presentation aids and graphics.
- CE H389 Honors Research Skills 1(1,0)** Research problem selection, research tools, research reports organization. *Preq:* CE H388.
- CE 402, H402, 602 Reinforced Concrete Design 3(3,0)** Design of reinforced concrete beams, slabs, columns, and footings using ultimate strength design. An introduction to working stress design methods is included. *Preq:* CE 301.
- CE 403, 603 Use of Computers in Structural Analysis and Design 3(3,0)** Analysis and design of statically determinate and indeterminate structural systems through the use of computers. Emphasis is placed on use of available computer programs likely to be used in industry. *Preq:* CE 301.
- CE 404, 604 Wood and Masonry Structural Design 3(3,0)** Introduction to wood design and engineering; properties of wood and wood-based materials; design of beams, columns, walls, roofs, panel systems, and connections; fundamentals of masonry materials, construction and structural systems; lateral load-resisting shear walls, loadbearing walls, columns and pilasters, and connections. *Preq:* CE 402.
- CE 405, 605 Structural Systems Design 3(3,0)** Study of physical properties and mechanical response of engineered structural systems. Analytical and approximate methods of structural analysis are used to generate comparative structural performance data. *Preq:* CE 302. *Coreq:* CE 402 or consent of instructor.
- CE 410, 610 Traffic Engineering: Operations 3(3,0)** Basic characteristics of motor-vehicle traffic, highway capacity, applications of traffic control devices, traffic design of parking facilities, engineering studies, traffic safety, traffic laws and ordinances, public relations. *Preq:* CE 310.
- CE 412, 612 Urban Transportation Planning 3(3,0)** Urban travel characteristics, characteristics of transportation systems, transportation and land-use studies, trip distribution and trip assignment models, city patterns and subdivision layout. *Preq:* CE 310.
- CE 417, 617 Airphoto Interpretation I 3(2,3)** A brief review of the basic geometry of aerial photographs, characteristics of geologic and topographic features identifiable from aerial photographs, and site characteristics related to soil profile. Laboratory work includes soil mapping, selection of construction sites, and location of soil deposits for engineering purposes. *Preq:* Junior standing.
- CE 422 Hydraulics and Hydrology 3(3,0)** Concepts of open channel flow, flow measurement, design of stable open channels, design of pump systems, precipitation, runoff, hydrograph analysis, flood routing, and hydrologic design. *Preq:* CE 340 or E M 320.
- CE 425 Civil Engineering Project Evaluation 3(3,0)** Comparison of design alternatives based on engineering economic analysis. Introduction of present worth, annual worth, and rate of return methods. Use of depreciation and taxation in project analysis. Examines sensitivity and benefit-cost-ratio analysis. Consideration of inflation in cost analysis. Other topics include engineering societies, professionalism, ethical considerations, engineering registration.
- CE 430, 630 Geotechnical Engineering Design 3(3,0)** Relationship of local geology to soil formations, groundwater, planning of site investigation, sampling procedures, determination of design parameters, foundation design and settlement analysis. *Preq:* CE 330.
- CE 432, 632 Construction Project Administration 3(3,0)** Development of fundamental concepts involved in the technical management of the construction phase of engineering projects. *Preq:* CE 324 or equivalent.
- CE 433, 633 Construction Planning and Scheduling 3(3,0)** Principles and applications of the Critical Path Method (CPM) and Project Evaluation and Review Techniques (PERT). Project breakdown and network graphics. Identification of the critical path and resulting floats. Definition and allocation of materials, equipment, and manpower resources. Resource leveling, compression, and other network adjustments. Computer applications using packaged routines. *Preq:* CE 324 or equivalent.
- CE 434, 634 Construction Estimating and Project Control 3(3,0)** Specifications, contracts, and bidding strategies. Purchasing and subcontracting policies. Accounting for materials, supplies, subcontracts, and labor. Procedural details for estimating earthwork, reinforced concrete, steel, and masonry. Overhead and profit items. *Preq:* CE 324 or equivalent.
- CE 438, H438, 638 Construction Support Operations 3(3,0)** Description of activities necessary for the completion of a construction job although not specifically recognized as direct construction activities. General conditions, safety, security, quality assurance, value engineering. Organizational support features and typical implementation procedures. *Preq:* CE 324 or equivalent and EX ST 301.
- CE 439, 639 Construction Equipment Selection and Maintenance 3(3,0)** Methodology of selecting the right equipment of the right size for each task of the construction job on the basis of power-train characteristics, crew size, terrain conditions, and job requirements. Cycle time, cost, specifications, maintenance, replacement policy, monitoring. *Preq:* CE 324 or equivalent.
- CE 446 Flood Hazards and Protective Design 3(3,0)** Study of flood hazards and methods of protective design of the built environment. Floodplain mapping and delineation. Methods for determining base flood elevations. Flood-resistant construction, flood proofing, and governmental regulations will be discussed. The course will include case studies and design projects. *Coreq:* CE 422.
- CE 450 Creative Problem Solving II 2(1,3)** Methods used in defining problems, generating and selecting alternatives, evaluating solutions; historical creativity, free thinking and characteristics of effective problem solvers. *Preq:* CE 250 and Senior standing.
- CE 451 Professional Seminar 1(1,0)** Various professional topics related to skills and techniques for evaluating career opportunities, seeking and obtaining civil engineering employment, career development, professional registration, professional ethics, and other factors necessary for achieving success in a professional career. To enable students to make better decisions that will help them succeed in their careers. *Preq:* Senior standing.
- CE 453, 653 Structural Analysis II 3(3,0)** Analysis of statically indeterminate structures, including continuous beams, trusses and frames by virtual work, Castigliano's theorems, three-moment equation, moment distribution, and slope deflection. Influence lines for statically indeterminate structures. Muller-Breslau principle. Approximate methods for indeterminate frames. Solution of indeterminate trusses and frames using microcomputers. Introduction to matrix structural analysis. *Preq:* CE 301, 305.
- CE 459 Capstone Design Project 3(1,6)** Designed to give students an opportunity to apply creativity of their engineering knowledge in the solution of open-ended design problems in civil engineering. Problems are formulated by faculty, and/or public and private agencies and are evaluated by a jury of faculty. *Preq:* All required 300 level CE courses and the Technical Design Requirement.
- CE 462, 662 Coastal Engineering I 3(3,0)** Introduction to coastal and oceanographic engineering principles, including wave mechanics, wave-structure interaction, coastal water-level fluctuations, coastal-zone processes, and design considerations for coastal structures and beach nourishment project. *Preq:* CE 340 or E M 320.
- CE 464, 664 Physical Models in Fluid Mechanics 3(2,2)** Classical techniques of dimensional analysis and similitude are presented for fluid mechanics problems with actual construction of an operating physical model to solve a practical engineering problem. Problem will be chosen from the areas of coastal engineering, waste-heat disposal, water quality, and river mechanics. Experimental design and instrumentation will be covered in detail. *Preq:* CE 340 or E M 320.
- CE 480, 680 Wind Engineering 3(2,2)** Study of the effects of wind forces on buildings, bridges, and other structures, including meteorological aspects of wind generation, aerodynamics of flow around buildings, structural responses and environmental flows. *Preq:* CE 301; CE 340 or E M 320.
- CE (E S E) 482, 682 Groundwater and Contaminant Transport 3(3,0)** See E S E 482.
- CE H488 Honors Research I 3(3,0)** Individual research under the direction of a Civil Engineering faculty member. *Preq:* CE H389.
- CE H489 Honors Research II 3(3,0)** Individual research under the direction of a Civil Engineering faculty member. *Preq:* CE H488.

C E 490, H490, 690 Special Projects 1-3(1-3,0) Studies or laboratory investigations on special topics in the civil engineering field which are of interest to individual students and staff members. Arranged on a project basis with a maximum of individual student effort and a minimum of staff guidance. May be repeated for a maximum of three credits. *Preq:* Senior standing.

C E 491, 691 Selected Topics in Civil Engineering 1-6(1-6,0) A structured study of civil engineering topics not found in other courses. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

COACHING EDUCATION

C ED 349 Introduction to Coaching 3(3,0) Investigation into the scientific basis of the coaching profession. Topics of exploration include physiology, kinesiology, and psychology as well as administration of an athletic program.

C ED 350 Scientific Basis of Coaching I: Exercise Physiology 3(3,0) Designed to increase understanding of basic scientific information concerning athletic performance by using the conceptual approach. In-depth investigation into the physiological principles that can enhance athletic performance will be the primary focus. Phases of physical training as well as comprehensive evaluative techniques will be included. *Preq:* C ED 349.

C ED 352 Scientific Basis of Coaching II: Kinesiology 3(3,0) Designed to increase the student's understanding of basic scientific information concerning athletic movement by utilizing the conceptual approach. Deals with the basic laws of human motion necessary in evaluation of athletic movement, utilizing joint structure and anatomic landmarks as a basis for motion. *Preq:* C ED 349.

C ED 353 Theory of Prevention and Treatment of Athletic Injuries 3(2,3) Designed to increase the student's understanding of principles involved in the prevention and treatment of athletic injuries. Deals with basic anatomy, first aid, and diagnostic techniques necessary for the understanding of basic athletic training procedures. *Preq:* C ED 349.

C ED 361 Administration and Organization of Athletic Programs 3(3,0) Study of modern techniques and practices used in administering athletic programs. Major emphasis areas such as practice and game organization, purchase and care of equipment, budget and finances, public relations, and legal liability in athletic programs are presented. *Preq:* C ED 349.

C ED 362 Psychology of Coaching 3(3,0) Study of psychological techniques utilized to promote maximum athletic performance. Areas of emphasis include motivation, coaching philosophy, athletic personality, mental preparation, and goal-oriented behavior. Not open to students who have taken C ED 342. *Preq:* C ED 349.

C ED 371 Coaching Baseball 1(0,3) Designed to increase understanding of basic technical and practical information concerning the coaching of baseball by utilizing the conceptual approach. Students will study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Total

program development will also be covered as it pertains to specific level of competition. *Preq:* C ED 349.

C ED 372 Coaching Basketball 1(0,3) Designed to increase understanding of basic technical and practical information concerning the coaching of basketball by utilizing the conceptual approach. Students will study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Total program development will also be covered as it pertains to specific levels of competition. *Preq:* C ED 349.

C ED 373 Coaching Cross Country 1(0,3) Designed to increase understanding of technical and practical information concerning the coaching of cross country by utilizing the conceptual approach. Students will study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Total program development will also be covered as it pertains to specific levels of competition. *Preq:* C ED 349.

C ED 374 Coaching Football 1(0,3) Designed to increase understanding of basic technical and practical information concerning the coaching of football by utilizing the conceptual approach. Students will study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Total program development will also be covered as it pertains to specific levels of competition. *Preq:* C ED 349.

C ED 375 Coaching Soccer 1(0,3) Designed to increase understanding of basic technical and practical information concerning the coaching of soccer by utilizing the conceptual approach. Students will study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Total program development will also be covered as it pertains to specific levels of competition. *Preq:* C ED 349.

C ED 376 Coaching Strength and Conditioning 1(0,3) Designed to increase understanding of basic technical and practical information concerning the coaching of strength and conditioning by utilizing the conceptual approach. Students will study basic principles of coaching, training program, and equipment appraisal as a means to improve athletic performance. Total program development will also be covered as it pertains to specific levels of competition. *Preq:* C ED 349.

C ED 377 Coaching Track and Field 1(0,3) Designed to increase understanding of basic technical and practical information concerning the coaching of track and field by utilizing the conceptual approach. Students will study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Total program development will also be covered as it pertains to specific levels of competition. *Preq:* C ED 349.

C ED 453, 653 Athletic Injuries: Prevention, Assessment and Rehabilitation 3(3,0) Designed to give the student an understanding of prevention, treatment, and rehabilitation procedures of injured athletes. *Preq:* C ED 349.

COMMERCE AND INDUSTRY

C & I 101 Business Foundations 1(1,0) An overview of the business environment. Topics include the economic and legal foundations of business, and an introduction to the human resources, marketing, operations, and financial functions of global businesses.

COMMUNITY AND RURAL DEVELOPMENT

(See courses listed under Agricultural and Applied Economics)

Professors: D. L. Barkley, G. L. Bradford, M. S. Henry, J. C. Hite, E. L. McLean

C R D 357 Natural Resources Economics 3(3,0)F The principles and problems involved in the use of soil, water, forest, and mineral resources, with special emphasis on economic aspects of alternative methods of resource utilization. *Preq:* APEC 202, ECON 200 or 211.

C R D (APEC) 361 Introduction to Health-Care Economics 3(3,0)F Introductory course in which students learn the basic economics of the institutions comprising the health-care industry. Topics include the underlying supply, demand, and institutional factors impacting health-care availability and cost of health care.

C R D (APEC) 411, 611 Regional Impact Analysis 2(2,0)F Techniques for analysis of the growth and decline of regions including economic-base theory, shift share, regional input-output, regional econometric models, and fixed impact models. *Preq:* AP EC 202 or ECON 211 and 212.

C R D (AP EC) 412, 612 Spatial Competition and Rural Development 3(3,0)S Development of rural economic activity in the context of historical, theoretical, and policy aspects of friction associated with spatial separation. Location factors, transfer costs, location patterns, and regional-growth policy are considered. *Preq:* AP EC 202 or ECON 211 or equivalent.

C R D (APEC) 491 Internship, Agribusiness, and Community and Rural Development 1-6(0,2-12) Internship under faculty supervision in an approved agency or firm. An internship is designed to provide students with work experience in agribusiness or community and rural development. Student will submit a comprehensive report within one week of the end of the internship. A maximum of six internship credits may be earned. *Preq:* Junior standing and/or consent of instructor.

COMPUTER ENGINEERING

(See Electrical and Computer Engineering)

COMPUTER SCIENCE

Professors: R. M. Geist III, S. M. Hedetniemi, S. T. Hedetniemi, *Chair:* E. W. Page III, J. C. Peck, A. J. Turner, Jr., J. M. Westall, Jr.; *Associate Professors:* H. C. Grossman, D. P. Jacobs, J. D. McGregor, A. W. Madison, R. P. Pargas, M. K. Smotherman, D. E. Stevenson; *Assistant Professors:* E. O. Hare, B. A. Malloy; *Lecturers:* C. F. Pellerin, H. A. Pellerin; *Visiting Assistant Professors:* G. A. Tagliarini, D. J. Poling

CPSC 101, H101 Computer Science I 4(3,2) [C,3] Introduction to modern problem solving and programming methods. Special emphasis is placed on algorithm development and software life cycle concepts. Course includes use of appropriate tools and discusses ethical issues arising from the impact of computing upon society. Intended for students concentrating in computer science or related fields. *Preq:* MTHSC 105 or satisfactory score (550) on the Mathematics Test, Level II (standard) or consent of instructor.

CPSC 102, H102 Computer Science II 4(3,2) Continuation of CP SC 101, with continued emphasis on problem solving and program development techniques. Typical numerical, nonnumerical, and data processing problems will be examined. Basic data structures will be introduced. *Preq:* CP SC 101.

CPSC 105 Essential Computer Skills I (0,2) Computer literacy, user environments, and software packages for education. Credit may not be received for both CP SC 105 and 120.

CP SC 110, H110 Elementary Computer Programming 3(3,0) [C,3] Introduction to computer programming and its use in solving problems, intended primarily for technical majors. Basic instruction in programming techniques is combined with tools use and discussions of ethical issues arising from the impact of computing on society.

CPSC 120 Issues in Computers 3(2,2) [C,3] Investigation of issues facing society based on the integration of computers into the everyday lives of professionals and citizens. Students will explore the ethical issues that result from the extensive use of computers in complex information systems and the presence of computers in an increasing array of equipment and appliances.

CPSC 121 Issues in Computers 2(2,0) Investigation of issues facing society based on the integration of computers into the everyday lives of professionals and citizens. Students will explore the ethical issues that result from the extensive use of computers in complex information systems and the presence of computers in an increasing array of equipment and appliances.

CPSC 130 Data Processing with COBOL 3(3,0) Introduction to data processing techniques and applications. Emphasis is placed on the organization and processing of data files. The COBOL programming language is used. *Preq:* CP SC 110 or 120, or equivalent.

CP SC 152 Introductory Pascal Programming 2(2,0) Introduction to computer programming in the Pascal language. *Preq:* Knowledge of a computer programming language.

CP SC 156 Introductory Basic Programming 1(1,0) Introduction to computer programming in the Basic language. *Preq:* Knowledge of a computer programming language.

CP SC 157 Introduction to C Programming 2(2,0) Introduction to basic programming techniques. The C programming language will be used.

CP SC 158 Introductory Modula-2 Programming 1(1,0) Introduction to computer programming in the Modula-2 programming language. *Preq:* Knowledge of a high-level computer programming language.

CP SC 210, H210 Programming Methodology 4(3,2) Introduction to programming techniques and methodology. Topics include structured programming, stepwise refinement, program design and implementation techniques, modularization criteria, program testing and verification, basic data structures, and analysis of algorithms. Credit may not be received for both CPSC 102 and 210. *Preq:* CP SC 110 or 130, or ENGR 180, or equivalent.

CP SC 220 Microcomputer Applications 3(3,0) Applications of microcomputers to formulate and solve problem models. Emphasis will be placed on applications development in database and spreadsheet environments. Current software products will be used. *Preq:* CP SC 120 or MGT 399 or equivalent experience.

CPSC 221 Introduction to a Computer Science Language 1(0,2) Introduction to the systems programming environment; languages and interfaces for programming operating systems tasks; use of the C programming language and UNIX operating system.

CP SC 231, H231 Computer Science III 4(3,2) Study of the machine architectures on which algorithms are implemented; requirements of architectures that support high-level languages, programming environments, and applications. Credit may not be received for both CP SC 230 and 231. *Preq:* CP SC 102 or 210, or equivalent.

CP SC 240, H240 Introduction to Data Structures 3(3,0) Basic concepts of data structures such as queues, stacks, and lists. Course includes the study of algorithms for the manipulation of data structures, the implementation of these algorithms in existing programming languages, and applications such as storage allocation and garbage collection. Credit may not be received for both CP SC 240 and 241. *Preq:* CP SC 102 or 210. *Coreq:* MTHSC 119.

CP SC 241, H241 Computer Science IV 4(3,2) Study of the data structures and algorithms fundamental to computer science; abstract data-type concepts; measures of program running time and time complexity; algorithm analysis and design techniques. Credit may not be received for both CP SC 240 and 241. *Preq:* CP SC 102 or 210 and CP SC 221 and MTHSC 119.

CP SC 255 Ada Programming Language 2(2,0) Advanced study of program design and problem solving using the Ada language. Topics such as packages, generics, and tasking will be covered. *Preq:* CP SC 102 or 210.

CP SC 270 Fundamentals of Information Systems 4(3,2) Computer information systems in a large-scale computing environment will be used to address systems analysis and design, database management, data communication, and security of information. Reading knowledge of a business-oriented programming language will be developed. May not be counted for credit toward a Computer Science or Computer Information Systems degree. *Preq:* CP SC 120.

CPSC 281 Selected Topics in Computer Science 1-4(0-3,0-6) Areas of computer science in which new trends arise. Innovative approaches to a variety of problems in the use and understanding of basic computing concepts will be developed and implemented. *Preq:* Consent of instructor.

CPSC 291 Seminar in Professional Issues I 1(1,0) The impact of computer use on society is considered. The ethical use of software and protection of intellectual property rights are discussed. The profession is viewed historically; organizations important to the profession are discussed; the development process for standards is presented; and the student is introduced to the professional literature. *Preq/Coreq:* CP SC 241 and consent of instructor.

CP SC 330, H330 Computer Systems Organization 4(3,2) Introduction to the structure and programming of computer systems. Various hardware/software configurations are explored and presented as integrated systems. Topics include basic computer organization, input/output organizations, interrupt processing and system software. *Preq:* CP SC 231, E C E 201 and MTHSC 119.

CP SC 332, H332 Computer Systems 3(3,0) Introduction to the design, integration, and use of hardware and software components in standard computer systems. Emphasis will be placed on computer organization at the component level, interfacing, basic operating system functions, and system utilities. Credit may not be received for both CP SC 332 and 422. *Preq:* CP SC 231. *Coreq:* CP SC 331.

CP SC 340 Algorithms and Data Structures 3(3,0) Basic concepts of data structures such as queues, stacks, and lists. Methods of proof as they relate to program verification. Sets, functions, and relations as they relate to the analysis of algorithms. Course includes the study of algorithms, time complexity, and design techniques. Credit may be received for at most one of CP SC 240, 241, and 340. *Preq:* CP SC 102 or 210.

CP SC 350 Foundations of Computer Science 3(3,0) Development of the theoretical foundations of programming, algorithms, languages, automata, computability, complexity, data structures, and operating systems; a broad range of fundamental topics is consolidated and extended in preparation for further study. *Preq:* CP SC 240, 241, MTHSC 119.

CP SC 360 Peripherals and File Design 3(3,0) Study of peripheral devices and data management as a basis for the design of information systems. Traditional data processing applications will be presented and evaluated in terms of efficiency and effectiveness. Problems using standard file organization and access techniques will be assigned. *Preq:* CP SC 241 or consent of instructor.

CP SC 361 Data Management Systems Laboratory 1(0,2) Introduction to mainframe environments typical of large-scale data processing applications; programming languages, control languages, and file utilities; use of COBOL language and IBM JCL. *Preq:* CP SC 102 or 210, or equivalent. *Coreq:* CP SC 360.

CP SC 371 Systems Analysis 3(3,0) Incorporates a study of the decision-making process at all levels with the logical design of information systems. Extensive study of the system life cycle with emphasis on current as well as classical techniques for describing data flows, data structures, file design, etc. *Preq:* CP SC 360.

CP SC 372 Introduction to Software Development 3(3,0) Techniques and issues in software design and development; tools, methodologies, and environments for effective design, development, and testing of software; organizing and managing the development of software projects. *Preq:* CP SC 241 or equivalent.

CP SC 405, 605 Introduction to Graphical Systems Design 3(3,0) Principles, computational techniques, and design concepts needed for designing systems for effective graphical displays. *Preq:* MTHSC 108, 311; CP SC 241, 360.

CP SC 422, H422, 622 Introduction to Operating Systems 3(3,0) Detailed study of the management techniques for the control of computer hardware resources. Topics include interrupt systems, primitive level characteristics of hardware and the management of memory, processor, devices, and data. Credit may not be received for both CP SC 332 and 422. *Preq:* CP SC 230, 231, 360. *Coreq:* CP SC 331.

CP SC 423, H423, 623 Implementation of Operating Systems 3(2,2) Detailed review of the implementation of an existing, multi-tasking operating system. Extension of concepts in laboratory to development and implementation of a system nucleus supporting multi-tasking and process coordination on an actual computer system. Emphasis is given to design decisions as they apply to performance and complexity. *Preq:* CP SC 332 or 422, or equivalent.

CP SC 428, H428, 628 Design and Implementation of Programming Languages 3(3,0) Overview of programming language structures and features and their implementation. Control and data structures found in various languages will be studied. Runtime organization and environment and implementation models will also be included. *Preq:* CP SC 231 and 241 or equivalent.

CP SC 429, H429, 629 Translation of Programming Languages 3(3,0) Techniques and considerations for compiling and interpreting programming languages. Topics include scanning, parsing, optimization, code generation and their theoretical foundations. The implementation of a compiler or a major component of a compiler normally will be a term project. *Preq:* CP SC 422, 428.

CP SC 430 Computer Performance Evaluation 3(3,0) Computer hardware and software measure and evaluation in selection and improvement. Topics include measurement tools, analytic and simulation models, workload models, and program performance. *Preq:* CP SC 332 or 422 and MTHSC 301; or equivalent.

CP SC 435 Microprogramming 3(3,0) Software development at the microprogram level. Topics include organization of microprogrammed computers, emulation, interpreter design, and high-level language support. A survey of microprogrammable machines is also included. *Preq:* CP SC 330 and 422; or consent of instructor.

CP SC 450, H450, 650 Theory of Computation 3(3,0) Introduction to models of computation and machine description languages, including finite-state automata and regular expressions, pushdown automata and context-free languages, and Turing machines and recursive functions. Topics include

equivalence and relative computing power of the models studied, enumeration, Church's thesis, and undecidability problems. *Preq:* CP SC 350.

CP SC 455 Computational Science 3(3,0) Introduction to the methods and problems of computational science. Course uses problems from engineering and science to develop mathematical and computational solutions. Case studies use techniques from Grand Challenge problems. Course emphasizes the use of networking, group development, and modern programming environments. *Preq:* MTHSC 106, 108, 311 and previous programming experience in a higher level language.

CP SC 462, H462, 662 Database Management Systems 3(3,0) Introduction to database/data communications concepts as related to the design of online information systems. Problems involving structuring, creating, maintaining, and accessing multiple-user databases will be presented and solutions developed. Comparison of several commercially available teleprocessing monitor and database management systems will be made. *Preq:* CP SC 360 and MTHSC 119.

CP SC 463, 663 Online Systems 3(3,0) Provides an in-depth study of the design and implementation of transaction processing systems and an introduction to basic communications concepts. A survey of commercially available software and a project using one of the systems are included. *Preq:* CP SC 462.

CP SC 464, 664 Introduction to Computer Architecture 3(3,0) Survey of von Neumann computer architecture at the instruction-set level. Fundamental design issues will be emphasized and will be illustrated using historical and current mainframe, supermini, and micro architecture. *Preq:* CP SC 330 or consent of instructor.

CP SC 472, H472, 672 Software Development Methodology 3(3,0) Advanced topics in software development methodology. Techniques such as chief programmer teams, structured design and structured walk-throughs will be discussed and used in a major project. The emphasis of this course is on the application of these techniques to large-scale software implementation projects. Additional topics such as mathematical foundations of structured programming and verification techniques will also be included. *Preq:* CP SC 360 and 372.

CP SC 481, H481, 681 Selected Topics 1-3(1-3,0) Areas of computer science in which nonstandard problems arise. Innovative approaches to problem solutions which draw from a variety of support courses will be developed and implemented. Emphasis will be placed on independent study and projects. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

CP SC 491 Seminar in Professional Issues II 1(1,0) The impact of computing system development on society is considered. Ethical issues in the design and development of computer software are discussed. Standards for professional behavior, the professional's responsibility to the profession, and techniques for maintaining currency in a dynamic field are discussed by students. *Preq:* Senior standing.

CP SC H495 Senior Thesis Research 1-3(1-3,0) Directed individual research project for honors students supervised by departmental faculty. May be repeated for a maximum of six credits. *Preq:* Senior standing.

CONSTRUCTION SCIENCE AND MANAGEMENT

Professors: C. L. Addison, N. L. Book, R. W. Liska; *Associate Professors:* M. D. Egan, F. M. Eubanks, C. Mathewson, Chair; J. M. Mumford; *Assistant Professor:* D. W. Goodloe; *Visiting Assistant Professor:* C. A. Piper

C S M 100 Introduction to Construction Science and Management 4(2,6) Introduction to the principles, terminology, communication techniques, and computer applications of the construction industry. *Preq:* Construction Science and Management major, or consent of department chair.

C S M 201 Structures I 3(3,0) Study of statically determinate structures including force applications and distributions in structural elements and the resulting stress-strain patterns in axial, shear and bearing mechanisms. *Preq:* MTHSC 102 or 106 and one semester of science requirement.

C S M 202 Structures II 3(3,0) Study of the force distribution in statically determinate structures and structural elements including moment and shear stress, combined loading/stress conditions and deflections. *Preq:* C S M 201.

C S M 203 Materials and Methods of Construction 3(3,0) Theory and principles of building construction with an overview of how the major components of a building fit together and the rationale behind their construction. *Preq:* Sophomore standing, Construction Science and Management major, or consent of department chair. *Coreq:* C S M 100.

C S M 204 Contract Documents 2(2,3) Introduction to working drawings, specifications, and the various documents required to carry out a typical construction project. *Preq:* C S M 203, Construction Science and Management major, or consent of department chair.

C S M 301 Structures III 3(3,0) Theory, analysis, and design of statically determinate steel and wood-structural components and systems; and introduction to reinforced concrete and reinforced masonry structures and systems. *Preq:* C S M 202.

C S M 302 Structures IV 3(3,0) Theory, analysis, and design of statically indeterminate steel, wood, and reinforced concrete structural components and systems and related structural concepts. *Preq:* C S M 301.

C S M 303 Soils and Foundations 3(2,3) Various types of soil will be studied, including related activities of testing, compaction, stability, and function. Various types of foundations will also be studied. *Preq:* C S M 202; Construction Science and Management major, or approval of department chair.

C S M 304 Environmental Systems I 3(3,0) Theory of heating, ventilating, air conditioning, electrical, lighting and plumbing systems as related to building. *Preq:* Junior standing.

C S M 310 Principles of Industrial Safety Management 3(3,0) Fundamentals of industrial safety management, including loss prevention, industrial hygiene and fire protection. *Preq:* Junior standing.

C S M 311 Accident Prevention and Loss Control 3(3,0) Philosophies and techniques of accident prevention and loss control, including risk assessment, hazard analysis, accident/near miss investigation, and methods to control and correct loss-producing conditions; also application of these techniques to current technologies. *Preq:* Junior standing.

C S M 312 Industrial Recognition and Control 3(3,0) Application of basic physical properties to the understanding, recognition, evaluation and control of biological, mechanical, electrical, thermal, chemical, ergonomic, and nuclear hazards in the industrial setting. *Preq:* Junior standing.

C S M 351 Construction Estimating 3(2,4) Basic estimating as applied to construction projects. Includes the take-off of material quantities, assigning labor and equipment production rates, and applying material prices, wage rates and equipment costs to derive a total job cost. *Preq:* C S M 204, Construction Science and Management major, or consent of department chair.

C S M 352 Construction Scheduling 3(2,4) Analysis of construction projects with emphasis on estimating, scheduling, and resource leveling. *Preq:* C S M 351, Construction Science and Management major, or consent of department chair.

C S M 401 Formwork and Placing Concrete 3(3,0) Study of the design and construction of concrete formwork and concrete mixes. *Preq:* C S M 202, Construction Science and Management major, or approval of department chair.

C S M 402, H402 Construction Equipment and Safety Management 3(3,0) Selection, financing, and management of construction equipment. Study of the basics of construction safety management and controls. *Preq:* ACCT 203; Construction Science and Management major, or consent of department chair.

C S M 403 Environmental Systems II 3(3,0) Theory of acoustical design and control, illumination, and life safety in buildings. *Preq:* Junior standing.

C S M 410 Fire Protection and Prevention 3(3,0) Fundamental course to increase awareness of the causes of uncontrolled fires and explosions. The associated dangers to life, property and industrial/commercial productivity are stressed, along with techniques available for their protection (education, detection, suppression). *Preq:* Junior standing.

C S M 411 Safety in Building Construction 3(3,0) Fundamentals of accident prevention and the Occupational Safety and Health Act as applied to the construction industry. Management-oriented programs that establish safety as a consideration of profitability and efficiency in a complex industry. *Preq:* Junior standing.

C S M 453 Construction Project Management 3(2,4) Study of construction business organization, methods of project delivery, field organization, policy, ethics, project management, control systems, labor management relations, and productivity. *Preq:* CSM 352, Construction Science and Management major, or consent of department chair.

C S M 454 Construction Capstone 6(2,12) A terminal project will be accomplished that demonstrates a refinement of previous knowledge gained in technical, management, and general education courses. *Preq:* C S M 453, Construction Science and Management major, or consent of department chair.

C S M 455, 655 Reducing Adversarial Relations in Construction 3(3,0) Course focuses on the study of the delivery of projects and how adversarial relations can affect the successful completion of the venture. Topics include the management of human resources, understanding the needs and processes of the participants, where the problems lie, methods of avoiding and settling disputes. *Preq:* Architecture and/or Construction Science and Management majors, or consent of instructor.

C S M 461 Construction Economics Seminar 3(3,0) Studies in the financial performance of construction companies. *Preq:* ACCT 203 and Senior standing, Construction Science and Management major, or consent of department chair.

C S M 490, H490 Directed Studies 1-3(1-3,0) Comprehensive studies and research of special topics not covered in other courses. Emphasis will be placed on field studies, research activities, and current development in construction science. May be taken for a maximum of six credits. *Preq:* Consent of instructor.

C S M 491 Construction Science and Management Internship 0 Eight hundred hours of verifiable construction-related experience.

C S M 498 Current Topics in Construction 1-3(1-3,0) Study of current topics in the construction industry not central to other construction science courses. Specific titles and course descriptions to be announced from semester to semester. May be taken for a maximum of six credits. *Preq:* Consent of advisor.

DESIGN STUDIES

Professor: C. L. Addison; *Associate Professor:* N. J. Hurt; *Visiting Professor:* B. Doruk

DSIGN 151 Design Studies I 3(1,6) Introduction to problem-solving methodology for environmental design through studio exercises, projects, and reviews. *Coreq:* DSIGN 153, admission to the College of Architecture.

DSIGN 152 Design Studies II 3(1,6) Continuation of DSIGN 151. *Preq:* DSIGN 151. *Coreq:* DSIGN 154.

DSIGN 153 Design Theory I 1(1,0) Introduction to concepts and principles of architecture, visual arts, landscape architecture, urban and regional planning, and construction management. *Coreq:* DSIGN 151.

DSIGN 154 Design Theory II 1(1,0) Continuation of DSIGN 153. *Coreq:* DSIGN 152.

DSIGN 251 Design Studies III 5(0,10) Studio work with adjunct demonstrations and lectures concerned with basic architectural design problems. *Preq:* DSIGN 152. *Coreq:* DSIGN 253.

DSIGN 252 Design Studies IV 5(0,10) Continuation of DSIGN 251. *Preq:* DSIGN 251. *Coreq:* DSIGN 254.

DSIGN 253 Design Theory III 1(1,0) Introduction to fundamental ideas and issues of architecture through the presentation of topics on theory, technology, and practice.

DSIGN 254 Design Theory IV 1(1,0) Continuation of DSIGN 253.

DSIGN 351 Design Studies V 5(0,10) Studio work with adjunct demonstrations and lectures concerned with intermediate architectural design problems. *Preq:* DSIGN 252. *Coreq:* DSIGN 353.

DSIGN 352 Design Studies VI 5(0,10) Continuation of DSIGN 351. *Preq:* DSIGN 351. *Coreq:* DSIGN 354.

DSIGN 353 Design Theory V 1(1,0) Continued study of ideas and issues of architecture through the presentation of topics on theory, technology, and practice.

DSIGN 354 Design Theory VI 1(1,0) Continuation of DSIGN 353.

DSIGN 451 Design Studies VII 5(0,10) Studio work with adjunct seminar/lecture concerned with advanced architectural design problems. *Preq:* DSIGN 352. *Coreq:* DSIGN 453.

DSIGN 452 Design Studies VIII 5(0,10) Continuation of DSIGN 451. *Preq:* DSIGN 451. *Coreq:* DSIGN 454.

DSIGN 453 Design Theory VII 1(1,0) Study of advanced ideas and issues of architecture through the presentation of topics on theory, technology, and practice.

DSIGN 454 Design Theory VIII 1(1,0) Continuation of DSIGN 453.

ECONOMICS

Professors: D. K. Benjamin, D. W. Blair, W. R. Dougan, *Chair:* G. P. Dwyer, R. D. Elliott, C. M. Lindsay, R. E. McCormick, M. T. Maloney, R. D. Shannon, G. R. Thompson, H. H. Ulbrich, M. S. Wallace, J. T. Warner; *Associate Professors:* D. B. Gordon, D. L. Placone, R. D. Sauer, Jr., C. J. Simon

ECON 200 Economic Concepts 3(3,0) Comprehensive course including both micro- and macro-economic concepts for the student not having theoretical course requirement beyond the principles level or for the student expecting to take a selected group of the 300-level courses in economics. Credit will not be given to students who previously have completed ECON 211 or 212.

ECON 201 Principles of Economics 3(3,0) Comprehensive and intense one-semester examination of microeconomics and macroeconomics. Course covers supply and demand, basics of microeconomics, and basics of macroeconomics. Using economics to understand the world around us is stressed throughout the course. More mathematical sophistication is assumed than in other 200-level economics courses. *Preq:* MTHSC 106.

ECON 211, H211 Principles of Microeconomics 3(3,0) Intensive study of the economics of the firm, pricing of resources, and international economic relations. Theory is given relevance through the analysis of current economic problems.

ECON 212, H212 Principles of Macroeconomics 3(3,0) Fundamental principles of pricing, stabilization, and growth in a modern economy. Topics include supply and demand, employment theory and fiscal policy, banking systems and monetary policy, and economic growth.

ECON 301 Economics of Labor 3(3,0) Introduces students to the economics of the labor market and labor relations. Considers the theories of wages and employment, determination, unemployment, investment in human capital, discrimination, and public policy toward the labor market. Also considers the role of labor unions. Cannot be used to satisfy requirements for a degree in Economics. *Preq:* ECON 200 or 201 or 211.

ECON 302 Money and Banking 3(3,0) Considers the function of money and banking in both the product and financial markets. Special emphasis is placed on monetary theory and current problems of monetary policy. Cannot be used to satisfy requirements for a degree in Economics. *Preq:* ECON 200 or 201 or 211.

ECON (MGT) 306 Managerial Economics 3(3,0) Uses tools of economic analysis in classifying problems in organizing and evaluating information, and in comparing alternative courses of action. Bridges the gap between economic theory and managerial practices. Cannot be used to satisfy requirements for a degree in Economics. *Preq:* ECON 200 or 201 or 211.

ECON 307 Arbitration 3(3,0) Analysis of dispute settlement procedures with specific emphasis on mediation, factfinding, and arbitration as they are used to resolve labor-management disputes in the public and private sectors. *Preq:* Consent of instructor.

ECON 308 Collective Bargaining 3(3,0) Practices, procedures, legal foundations, and legal structure associated with collective bargaining. Form and content of the labor contract, grievance machinery, and mediation and arbitration institutions will also be studied. *Preq:* ECON 200 or 211.

ECON 309 Government and Business 3(3,0) Relationships between government and business, including among other topics, government efforts to enforce competition; to regulate public utilities; and to protect the special interest of laborers, farmers, and consumers. *Preq:* ECON 200 or 211.

ECON 310 International Economy 3(3,0) Studies of the process of international commerce. Covers basic theory of trade and exchange rates, institutional and legal environment, current policy issues. Not open to students who have taken ECON 412. Cannot be used to satisfy requirements for a degree in Economics. *Preq:* ECON 200 or 201 or both 211 and 212, or consent of instructor.

ECON 314 Intermediate Microeconomics 3(3,0) Analytical study of the basic concepts of value and distribution under alternative market conditions. *Preq:* ECON 211 or 200 and consent of instructor.

ECON 315 Intermediate Macroeconomics 3(3,0) Formerly ECON 407. Macroeconomic problems of inflation and unemployment form the focal points. Statistics (GNP and the Consumer Price Index) and theory (Classical, Keynesian, and Monetarist views) will be included. Pertinent public policies designed to deal with these problems will be analyzed. *Preq:* ECON 200 or 212.

ECON 319 Environmental Economics 3(3,0) Study of the application of economic logic to issues surrounding environmental management and policy. The course examines individual, firm, and collective decision making as well as the evolution of regulatory approaches for controlling environmental use. *Preq:* ECON 314.

ECON 324 Economics and Sports 3(3,0) Economic analysis of sports teams, leagues, and institutions. Analysis of basic economic issues using sports data. *Preq:* Sophomore standing and ECON 201 or 211.

ECON H390 Junior Honors Research 1(1,0) Readings and research in conjunction with an approved economics course at the 300 or 400 level. Honors status required. May be taken three times.

ECON 401 Labor Market Analysis 3(3,0) Develops the methods of economic analysis of labor markets. Requires students to apply these methods to problems of the labor market. Topics to be examined include labor demand and supply, human capital, occupational choice, compensating wage differentials, organizational wage structures and incentive systems, unemployment and discrimination. *Preq:* ECON 314.

ECON 403, 603 Development of Economic Thought 3(3,0) Study of the origin and evolution of economic ideas with some emphasis on historical context, problems which inspired these ideas, and nature of the solutions which they provided from ancient days to the present. *Preq:* ECON 200 or 211, 212.

ECON 404, 604 Comparative Economic Systems 3(3,0) A comparative analytical and historical study of the principal economic systems which have been important in the modern world including among others, capitalism and socialism. *Preq:* ECON 200 or 211.

ECON 405, 605 Introduction to Econometrics 3(3,0) Formerly ECON 311. Elements of time series analysis and introduction to the measurement, specification, estimation and interpretation of functional relationships through single equation least square techniques. Problems of multicollinearity, dummy variables, heteroscedasticity, autocorrelation, and lagged variables in simple economic models are introduced.

ECON 410, 610 Economic Development 3(3,0) Consideration and analysis of economic and related problems of underdeveloped countries. Attention will be given to national and international programs designed to accelerate solution of these problems. *Preq:* ECON 200 or 211, 212.

ECON 412, 612 International Microeconomics 3(3,0) Analysis of the principles governing trade between nations. Topics include comparative advantage, theory and practice of commercial policy, introduction to exchange rates, and balance of payments. Not open to student who have taken ECON 310. *Preq:* ECON 211, 212, and 314 or consent of instructor.

ECON 413 International Macroeconomics 3(3,0) Macroeconomic problems of unemployment and inflation will be examined from the perspective of a national economy which is linked to and not independent of the world economy. *Preq:* ECON 211 and 212.

ECON 419, 619 Economics of Defense 3(3,0) Examines the American defense establishment in terms of resources utilized, alternative uses, and the contribution to the national economy and scientific progress generated by resources in a defense use. Discussed are economic problems inherent in shifting resources between defense and nondefense uses and among alternative defense uses. *Preq:* ACCT 200 or 201, ECON 200 or 211.

ECON 420, 620 Public Sector Economics 3(3,0) Study of the role of government and its proper functions and limitations in a market. Provision of goods and services by all levels of government and instruments of taxation are evaluated according to efficiency and equity criteria. Contemporary public sector issues are emphasized throughout. *Preq:* ECON 314 or consent of instructor.

ECON 422, 622 Monetary Economics 3(3,0) An intensive study of the role of monetary factors in economic change. Modern monetary theories and their empirical relevance for policy are developed against a background of monetary history and institutions. *Preq:* ECON 314.

ECON 424, 624 Organization of Industries 3(3,0) Empirical, historical, and theoretical analyses of market structure and concentration in American industry: the effects of oligopoly, monopoly, and cartelization upon price, output and other policies of the firm; antitrust and other public policies and problems will be studied. *Preq:* ECON 314 or consent of instructor.

ECON 430 Advanced Economic Theory 3(3,0) Traditional economic theories are derived using elementary mathematics. Major emphasis is placed upon microtheoretical models. Specialized topics such as cartel theory, national income analysis, price discrimination, and optimization theory over time will be economically analyzed, using mathematical tools. *Preq:* ECON 314, MTHSC 106.

ECON H491 Senior Honors Thesis Research 3(3,0) Reading and research for the Senior Honors Thesis. *Preq:* ECON 314 and 315 and senior honors standing.

ECON H492 Senior Honors Thesis Writing 3(3,0) Writing and oral presentation of the Senior Honors Thesis. *Preq:* ECON H491.

ECON 496 Independent Study 1-3(1-3,0) Research and writing on a selected economics topic chosen by the student. A written proposal must be approved by the instructor prior to the start of the semester. May be repeated for a maximum of six credit hours. *Preq:* ECON 314.

ECON 498 Current Topics in Economics 3(3,0) Discussion of current topics and research methods in economics. Students will write several short papers on current issues. *Preq:* Consent of instructor.

ECON 499 Senior Seminar in Economics 3(3,0) Discussion of topics of current interest in economics. Students will do directed research on a particular topic. *Preq:* Consent of instructor.

EDUCATION: CURRICULUM AND INSTRUCTION

Professors: I. C. Briscoe, S. L. Buckner, M. S. Crosby, R. P. Green, Jr., Chair; W. H. Leonard, J. F. Yukish; *Associate Professors:* L. B. Hart, K. N. Headley, B. C. Naff, E. M. Owens; *Assistant Professors:* S. W. Barbary, L. J. Curry, P. J. Dunston, R. A. Kaminski, A. R. Milo, V. G. Ridgeway, D. A. Stevens; *Lecturers:* N. S. Wilkinson; *Visiting Assistant Professor:* L. M. Monroe; *Instructor:* J. K. Weir

ED 100 Orientation 1(1,0) Lectures and discussions on teaching. For a minimum of ten weeks, students will spend one hour per week in schools assisting teachers, observing, and tutoring individuals. Required of all students in Early Childhood Education, Elementary Education, Secondary Education, Mathematics Teaching, and Science Teaching. To be taken Pass/Fail only.

ED 101 Reading Improvement 1(0,3) Provides an individualized approach to developmental reading skills emphasizing comprehension, vocabulary, and rate.

ED 102 Efficient Reading 1(0,3) Extends the reading skills of vocabulary, comprehension, and rate stressing skimming, scanning, flexibility, and critical reading.

ED 103 Learning Strategies 2(3,0) Students learn strategies of active learning and critical thinking skills which become an integral part of their natural thinking processes. Students learn how to generalize and apply newly acquired strategies to a variety of settings and situations.

ED 321 Physical Education for Elementary School: Games and Sports Skills 3(3,0) Values, purposes, and uses of creative games and games of low organization. Basic skills and lead-up activities for children. Methods of instruction and time allotments appropriate for elementary school programs. *Preq:* Junior standing (for Elementary majors); Senior standing and concurrent enrollment in ED 400, 459, 483, 488 (for Early Childhood Majors); Education major; minimum grade-point ratio of 2.0; or consent of instructor for non-education majors.

ED 400 Early Childhood Field Experience 1(0,3) Designed to provide practical classroom experience in early childhood education prior to the student teaching semester for the Early Childhood Education major. For a twelve-week period, students will spend two hours per week in schools observing, tutoring, conducting small group activities, and teaching the class. To be taken Pass/Fail only. *Preq:* ED 100, ED F 334, 336; concurrent enrollment in ED 321, 459, 483, 488; Senior standing; and minimum grade-point ratio of 2.0.

ED 401 Elementary Field Experience 1(0,3) Designed to provide practical classroom experience prior to the student teaching semester for the Elementary Education major. For a twelve-week period, students will spend two hours per week in schools observing, tutoring individuals, conducting small group activities, and teaching the class. To be taken Pass/Fail only. *Preq:* ED 100, ED F 334, concurrent enrollment in ED 451, 460, 487, 488; Senior standing; and minimum grade-point ratio of 2.0.

ED 412 Directed Student Teaching in Secondary School Subjects 12(1,33) A program of supervised observation and teaching in cooperation with selected public schools in which opportunities are provided for prospective teachers to obtain experiences in the subject area. Students to be sectioned according to teaching fields: English, history, social science, mathematical sciences, modern languages, science. Enrollment is limited.

ED 417 Teaching Internship in the Secondary School 6(1,15) Full-time, supervised teaching internship for one semester in cooperation with a participating South Carolina secondary school. Reserved for students seeking certification in critical-need teaching areas. May be repeated for a maximum of 15 credits. To be taken Pass/Fail only. *Preq:* ED F 301, 302, 335, ED 498, and one of the following: ED 424, 425, 426, 427. Application approved by the College of Education.

ED 424 Teaching Secondary English 3(2,2) Development of instructional practices and materials appropriate for secondary English; familiarization with curriculum materials; includes field experiences in local schools in preparation for student teaching. *Preq:* Second semester Junior standing, admission to the professional level, and concurrent enrollment in ED 498.

ED 425 Teaching Secondary Modern Languages 3(2,2) Development of instructional practices and materials appropriate for secondary modern languages; familiarization with curriculum materials; includes field experiences in local schools. *Preq:* Second semester Junior standing, admission to the professional level, and concurrent enrollment in ED 498.

ED 426 Teaching Secondary Mathematics 3(2,2) Development of instructional practices and materials appropriate for secondary mathematics; familiarization with curriculum materials; includes field experiences in local schools. *Preq:* Second semester Junior standing, admission to the professional level, and concurrent enrollment in ED 498.

ED 427 Teaching Secondary Science 3(2,2) Development of instructional practices and materials for teaching secondary school science (biological, earth and physical sciences); familiarization with secondary science curriculum materials; includes field experiences in local schools. *Preq:* Second semester Junior standing, admission to the professional level, and concurrent enrollment in ED 498.

ED 428, H428 Teaching Secondary Social Studies 3(2,2) Development of instructional practices and materials appropriate for secondary social studies; familiarization with curriculum materials; includes field experiences in local schools in preparation for student teaching. *Preq:* Second semester Junior standing, admission to the professional level, and concurrent enrollment in ED 498.

ED 431, 631 Special Institute Course: Early Childhood Education 1-3(1-3,0) Subject areas organized according to institute needs.

ED 432, 632 Special Institute Course: Elementary School 1-3(1-3,0) Subject areas organized according to institute needs.

ED 433, 633 Special Institute Course: Secondary School 1-3(1-3,0) Subject areas organized according to institute needs.

ED 434, 634 Special Institute Course: Current Problems in Education 1-3(1-3,0) Subject areas organized according to institute needs.

ED 435, 635 Special Institute Course: Curriculum 1-3(1-3,0) Subject areas organized according to institute needs.

ED 436 Special Institute Course: Supervision and Administration 1-3(1-3,0) Subject areas organized according to institute needs.

ED 440, 640 Advanced Physical Education Methods for the Classroom Teacher 3(3,0) Will help the experienced teachers in public schools expand their knowledge and understanding of physical education. *Preq:* ED 321 or equivalent and minimum grade-point ratio of 2.0.

ED 441, 641 Middle School Curriculum 3(3,0) Concepts and methods for teaching middle school students. Discusses nature of middle school students, teacher characteristics, curricular and co-curricular programs, organization and teaching.

ED 451 Elementary Methods in Science Teaching 3(3,0) Development of process skills, technical skills, and attitudes needed to foster increased confidence and commitment to the teaching of elementary science, with emphasis on teaching strategies and techniques and their implications for what we know of how children learn science. *Preq:* PH SC 107, 108; BIOL 109; Senior standing and concurrent enrollment in ED 401, 460, 487, 488 (for Elementary majors); Education major and minimum grade-point ratio of 2.0.

ED 452 Elementary Methods in Mathematics Teaching 3(3,0) Special emphasis is given the development of understanding, skills, and attitudes in the elementary curriculum with focus on strategies, techniques, and materials for teaching elementary mathematics. *Preq:* MTHSC 115, 116, 216 (for Elementary majors); Education major and minimum grade-point ratio of 2.0.

ED 459 Teaching Reading in the Early Grades 3(3,0) Course will provide early childhood and elementary education majors with an understanding of teaching reading in the elementary school setting in kindergarten through third grade. Students will investigate general principles of language and literacy development and will learn methods for teaching and assessing children's literacy. *Preq:* ED F 301, 302, 336, Junior standing, and a minimum grade-point ratio of 2.0. *Coreq:* ED 400 for early childhood majors.

ED 460 Teaching Reading in the Intermediate Grades 4-8 3(3,0) Course will provide elementary education majors with an understanding of teaching reading in the elementary school setting in grades four through eight. Students will investigate general principles of language and literacy development and will learn methods for teaching and assessing children's literacy. *Preq:* ED F 301, 302, 334, Senior standing, and a grade-point ratio of 2.0. *Coreq:* ED 401 for elementary majors.

ED 461, H461, 661 Teaching Reading in the Elementary School 3(3,0) Study of various phases of reading and their relation to the elementary program. Emphasis on modern practices in the classroom teaching of reading. *Preq:* ED F 301, 302, 336 (for Early Childhood majors), Junior standing, and a grade-point ratio of 2.0.

ED 462, H462 Diagnostic and Corrective Reading 3(2,3) The purpose of this course is to prepare prospective classroom teachers for diagnosing and correcting reading problems. Laboratory field experiences will be arranged for each individual. *Preq:* ED 461 or consent of instructor, Senior standing, and a minimum grade-point ratio of 2.0.

ED 466 Introduction to Early Childhood Education 3(3,0) Introductory course for Early Childhood Education, which includes an overview of curriculum for kindergarten and primary grades. *Preq:* ED F 336 or concurrent enrollment, Junior standing, and a minimum grade-point ratio of 2.0.

ED 481 Directed Teaching in the Elementary School 12(1,33) Supervised observation and teaching experiences in cooperation with selected elementary schools. Enrollment is limited to seniors or graduates who have completed prerequisite courses. *Preq:* ED 401, 451, 460, 487, 488; Senior standing; minimum grade-point ratio of 2.0; and consent of area committee chair.

ED 483 Methods and Materials for Early Childhood Education 3(3,0) Study of methods and materials applicable to nursery schools, kindergarten, and early elementary grades. *Preq:* ED 466, concurrent enrollment in ED 321, 400, 459, 488; Senior standing; and a minimum grade-point ratio of 2.0.

ED 484 Directed Teaching in Early Childhood Education 12(1,33) Supervised observation and teaching experiences in cooperation with nursery, kindergarten, and early elementary schools. Enrollment is limited to seniors or graduates who have completed prerequisite courses and have the accumulated grade-point ratio for graduation. *Preq:* ED 321, 400, 459, 483, 488; Senior standing; a minimum grade-point ratio of 2.0; and consent of the area committee chair.

ED 485 Methods and Curriculum in Elementary Mathematics and Science 3(3,0) Development of understanding, skills, and attitudes in the elementary mathematics and science curricula, with emphasis on strategies, techniques, and materials for teaching elementary mathematics and science. *Preq:* MTHSC 115, 116, 216, completion of the 12-hour science requirement, Junior standing, and a minimum grade-point ratio of 2.0.

ED 487 Teaching Social Studies in the Elementary School 3(3,0) Provides the pre-service teacher with an introduction to the skills of social studies and methods, materials, and techniques needed to teach these skills to students in the elementary school. *Preq:* HIST 172, 173; GEOG 101 or 103; concurrent enrollment in ED 401, 451, 460, 488 (for Elementary majors); and a minimum grade-point ratio of 2.0.

ED 488 Teaching the Language Arts in the Elementary School 3(3,0) Provides the pre-service teacher with an introduction to the skills of the language arts other than reading and the methods, materials, and techniques needed to teach these skills to students in the elementary school. *Preq:* ENGL 101, 102, 385; concurrent enrollment in ED 400, 459, 483 (for Early Childhood majors); concurrent enrollment in ED 401, 451, 460, 487 (for Elementary majors); Senior standing; and a minimum grade-point ratio of 2.0.

ED 498, H498 Secondary Content Area Reading 3(2,2) Designed for pre-service teachers who are involved with field experiences prior to student teaching full time. The course is designed to prepare content area teachers to teach the reading skills necessary for effective teaching of content area material. *Preq:* Admission to Professional Level Education Program.

EDUCATIONAL COUNSELING

ED C 234 Introduction to Addictions: Basic Education and Prevention 3(3,0) Designed to give the student a basic review of addictions and chemical dependence and to give future educators skills in the identification of chemical abuse, techniques for intervention, and methods of prevention education. SOC 396 and 397 are recommended as follow-up courses for those interested in pursuing the topic.

EDUCATIONAL FOUNDATIONS

Professors: D. E. Barrett, J. H. Walker; *Associate Professors:* W. R. Fisk, Chair; C. L. Peters, L. B. Reardon, C. G. Weatherford; *Assistant Professors:* G. C. Delicio, D. M. Switzer; *Lecturer:* E. C. Williams.

ED F 301, H301 Principles of American Education 3(3,0) Study of the legal basis, historical development, characteristics, and functions of educational institutions in the United States. *Preq:* Minimum grade-point ratio of 2.0.

ED F 302, H302 Educational Psychology 3(3,0) Introduction to classroom use of objectives, motivation theories, learning theories, tests and measurements, classroom management, and knowledge of exceptional learners. *Preq:* Minimum grade-point ratio of 2.0.

ED F (THRD) 315 Integrating Computers into the Classroom 1(0,2) Student will learn how to use microcomputers to supplement the classroom curriculum and to enhance classroom management. *Preq:* Admission to a Teacher Education Program; ED F 301 and 302; fulfillment of the General Education computer skills requirement; minimum grade-point ratio of 2.0; or consent of instructor.

ED F 334, H334 Child Growth and Development 3(3,0) Introduction to lifespan development. Heavy emphasis is placed on the physical, social, emotional, and cognitive characteristics. Includes a minimum of 5 one-hour observation participation visits to an elementary school. *Preq:* ED 100 or concurrent enrollment and minimum grade-point ratio of 2.0; or consent of instructor for non-education majors.

ED F 335, H335 Adolescent Growth and Development 3(3,0) Introduction to lifespan development. Emphasis placed on the physical, social, emotional, and cognitive characteristics of the 10- to 18-year old and the educational implications of those developmental characteristics.

ED F 336, H336 Behavior of the Preschool Child 3(3,0) Study of the behavior of the preschool child from infancy through age five. Theoretical concepts and observation of children's behavior are integrated, analyzed, and evaluated to discover implications for teaching and guiding preschool children. Includes a minimum of 10 one-hour obser-

vation-participation visits in public kindergarten. *Preq:* ED F 334, a minimum grade-point ratio of 2.0 or consent of instructor.

ED F 406 Philosophy, Schooling, and Educational Policy 3(3,0) Analysis of the development of contemporary educational theory and its impact on current schooling practices and educational policy development.

ED F (PRTM) 415, 615 Methods in Reducing Risks for Middle Childhood 3(2,3) Designed to develop a knowledge base for professionals who work with at-risk children. Students will work in a field setting to apply knowledge, develop and practice skills, and cooperate with professionals from various disciplines. *Preq:* Junior standing.

ED F 458 Health Education 3(3,0) Study of the information needed for effective cooperation with parents, physicians, and public health agencies in the promotion and improvement of community health, including problems of personal hygiene, health records, immunization, and control of communicable disease. *Preq:* Minimum grade-point ratio of 2.0.

ED F (AG ED, THRD) 480, 680 Educational Applications of Microcomputers 3(2,2) Fundamentals of computer applications for teachers. Course develops competencies in general computer applications such as word processing and database management and addresses educational uses of the Internet and computer-assisted instruction, with emphasis on legal and ethical issues and the impact of computer technology upon society. *Preq:* Admission to a Teacher Education Program; for ED F 680, Graduate standing.

ED F (AG ED, THRD) 482, 682 Advanced Educational Applications of Microcomputers 3(2,2) Course is designed to provide students with the knowledge and skills needed to apply microcomputer technology to the utilization and generation of educational software in accordance with sound educational principles. *Preq:* ED F (AG ED, THRD) 480.

ED F 490, 690 Student Management and Discipline 3(3,0) Designed to aid pre-service and in-service teacher development and to refine knowledge, skills, and values important for managing students in school settings. Practical application of theory and research and legal and ethical considerations will be emphasized. *Preq:* ED F 302 or PSYCH 201; ED F 334 and 335 or suitable alternative; and minimum grade-point ratio of 2.0.

ED F 497, 697 Instructional Media in the Classroom 3(3,0) An integrated approach to the use of audiovisual media stressing systematic planning, selection, utilization, and evaluation as well as production of materials and equipment operation. *Preq:* Minimum grade-point ratio of 2.0.

ELECTRICAL AND COMPUTER ENGINEERING

Professors: A. W. Bennett, C. M. Butler, T. L. Drake, D. J. Dumin, B. E. Gilliland, A. A. Girsig, J. N. Gowdy, J. W. Harrison, Jr., J. J. Komo, J. F. Leatherum, J. Y. Luh, E. B. Makram, L. W. Pearson, K. F. Poole, Chair; M. B. Pursley, R. J. Schalkoff, R. Singh, R. W. Snelsire; *Associate Professors:* E. G. Baxa, Jr., J. E. Bennett, M. A. Bridgwood, E.

R. Collins, Jr., D. M. Dawson, D. L. Lubkeman, T. W. Morgan, A. E. Turner, X.-B. Xu; *Assistant Professors*: C. W. Baum, M. Franklin, K. A. Liburdy, *Research Associate*: W. B. Ligon III, A. Q. Martin, R. L. Moose, D. L. Noneaker; *Lecturer*: D. McAuliff

E C E 201 Logic and Computing Devices 3(2,2) Study of logic with an introduction to Boolean algebra. Number systems and representation of information. The use of integrated circuits to implement combinational and sequential logic functions and computing elements. The organization and structure of computing systems. *Preq*: MTHSC 108, PHYS 122.

E C E 202, H202 Electric Circuits I 3(3,0) DC resistive circuits, Kirchhoff's Laws, Nodal and Mesh emphasis, sources, Thevenin's and Norton's theorems, RC, RL, RCL circuit solutions with initial condition using homogenous or nonhomogenous ordinary differential equations having constant coefficients. Develop sinusoidal steady state solution. *Preq*: MTHSC 108, PHYS 122. *Coreq*: E C E 211, PHYS 221.

E C E 204 Circuit Analysis Problems I 1(0,3) Analysis and solution of electrical network problems using mesh and nodal analysis, Thevenin's and Norton's theorems and equivalent circuits and other circuit analysis from E C E 202. *Coreq*: E C E 202.

E C E 211 Electrical Engineering Laboratory I 1(0,2) Principles of measurement and instruments used to measure parameters and dynamic variables in electric circuits, steady state and transient measurements in DC and AC circuits, and data analysis methods are included. *Coreq*: E C E 202.

E C E 212 Electrical Engineering Laboratory II 1(0,2) Measurement techniques in AC steady-state circuits, and comparison to theoretical predictions are emphasized. Two-port network methodology and transfer functions are studied experimentally, and related to analysis using transform techniques. *Preq*: E C E 202, 211. *Coreq*: E C E 262.

E C E 262, H262 Electric Circuits II 3(3,0) Continuation of the study of electric circuits, including three-phase circuits, complex frequency and network functions, frequency response, two-port parameters, magnetically-coupled circuits, Laplace transforms, and introduction to Fourier series and transforms. *Preq*: E C E 202, MTHSC 206, PHYS 221. *Coreq*: E C E 212, MTHSC 208.

E C E 263 Circuit Analysis Problems II 1(0,3) Analysis of basic AC circuit analysis techniques to analyze the transient and steady-state behavior of both simple and complex circuits. *Coreq*: E C E 262, MTHSC 208.

E C E 272 Computer Organization 4(3,2) Introductory course in computer organization and architecture. Topics include basic hardware and software structure, addressing methods, programs control, processing units, I-O organization, arithmetic, main-memory organization, peripherals, microprocessor families, RISC architectures, and multiprocessors. *Preq*: E C E 201 and CP SC 157 or 210.

E C H300 Junior Honors Seminar 1(2,0) Course designed to acquaint students enrolled in the Electrical and Computer Engineering Departmental Honors Program with current research activities in the department. The faculty will provide semi-

nars where research interests are summarized. Seminars are planned to prepare the students in choosing a research topic for their senior thesis.

E C E 307 Basic Electrical Engineering 2(2,0) A first course in electrical engineering to provide non-Electrical Engineering majors with a knowledge of electric circuit theory, both DC and AC. The last five weeks of the semester are devoted to an introduction to digital systems. *Preq*: MTHSC 206, PHYS 221. *Coreq*: E C E 309.

E C E 308 Electronics and Electromechanics 2(2,0) Continuation of E C E 307. Energy conversion systems are considered, as well as basic electronics. *Preq*: E C E 307.

E C E 309 Electrical Engineering Laboratory I 1(0,2) A laboratory designed to accompany E C E 307. Basic electrical circuits and instrumentation. *Coreq*: E C E 307.

E C E 311 Electrical Engineering Laboratory III 1(0,2) Measurements and characteristics of electronic devices and circuits; use of manual and automated instruments to acquire data; oral and written engineering reports. *Preq*: E C E 262, MTHSC 208, PHYS 221. *Coreq*: E C E 320.

E C E 312 Electrical Engineering Laboratory IV 1(0,2) Design and characterization of functional circuits using solid-state devices; use of manual and automated instruments for measurements; statistical analysis of data; and preparation of engineering reports. *Preq*: E C E 311, 320. *Coreq*: E C E 321.

E C E 317 Random Signal Analysis 3(3,0) Introduction to engineering problems of a probabilistic nature. Systems transformations, statistical averages, simulation, and estimation of system parameters. *Preq*: E C E 262, MTHSC 208. *Coreq*: E C E 330.

E C E 320 Electronics I 3(3,0) Introduction to electronic materials and devices. Principles of design. Design of DC and AC circuits using diodes, bipolar junction transistors, field-effect transistors and use of transistors in digital circuits. *Preq*: E C E 262, MTHSC 208, PHYS 221. *Coreq*: E C E 311.

E C E 321 Electronics II 3(3,0) Analysis and design of discrete amplifier circuits at low and high frequencies. Operational amplifiers, distortion in amplifiers, oscillator design, and circuit analysis of active digital devices. *Preq*: E C E 320. *Coreq*: E C E 312.

E C E 329 Computer Systems Structures 3(3,0) Fundamental structures and issues that arise in the analysis and implementation of computer systems. Topics include operating systems structures and data structures and their relationship to computer organization. Engineering science background for computer systems design. *Preq*: CP SC 210, 240, E C E 272.

E C E 330, H330 Signals, Systems, and Transforms 3(3,0) Systems models, analysis of signals, Fourier series and transforms, sampling and Z transforms, discrete Fourier transforms. *Preq*: E C E 262, MTHSC 208.

E C E 360 Electric Power Engineering 3(3,0) Course presents the basic principles of electromagnetic induction and electromagnetic forces developed. Topics include synchronous machines, power transformers, electric power transmission

and distribution systems, DC motors, and induction motors. *Preq*: E C E 262 and PHYS 221.

E C E 371 Microcomputer Interfacing 4(1-3,1-3) Interfacing of microcomputers to peripherals or other computers for purposes of data acquisition, device monitoring and control, and other communications. The interfacing problem is considered at all levels including computer architecture, logic, timing, loading, protocols, and software laboratory for building and simulating designs. *Preq*: E C E 262, 272. *Coreq*: E C E 320.

E C E 380 Electromagnetics 3(3,0) Introduction to electric fields and potentials, dielectrics, capacitance, resistance, magnetic field, forces, work and energy, inductance, time-varying fields, and Maxwell's equations. *Preq*: E C E 262, PHYS 221, MTHSC 206.

E C E 381 Fields, Waves, and Circuits 3(3,0) Foundation of circuit theory, transmission lines and circuits, plane-wave propagation, fiber optics, radiation and antennas, coupled circuits. *Preq*: E C E 380, MTHSC 208.

E C E 404, 604 Semiconductor Devices 3(3,0) Consideration of the principles of operation, external characteristics, and applications of some of the more important semiconductor devices presently available. *Preq*: E C E 320. *Coreq*: MTHSC 311 or 434.

E C E 405 Design Projects in Electrical and Computer Engineering 1-3(0,2-6) Individually defined projects oriented toward providing experience in establishment of objectives and criteria, synthesis, analysis, construction, testing and evaluation. Development of student creativity through the solution of open-ended problems. Individual instruction in design methodology. Maximum of three credit hours. *Preq*: E C E 302 or 330 or 409, consent of project supervisor.

E C E 406, 606 Introduction to Microelectronics Processing 3(3,0) Microelectronic processing, MOS and bipolar monolithic circuit fabrication, thick and thin film hybrid fabrication, applications to linear and digital circuits, fundamentals of device design. *Preq*: E C E 320. *Coreq*: MTHSC 311 or 434.

E C E 407, 607 VLSI Reliability 3(3,0) Reliability concepts applied to VLSI components. Methods of reliability determination, prediction, and attribute assessment. Failure analysis techniques. Wearout related mechanisms. Role of defects and electrical overstress in reliability. Reliability growth through design and process control. *Preq*: E C E 320. *Coreq*: MTHSC 311 or 434.

E C E 409 Continuous and Discrete Systems Design 3(3,0) Introduction to classical linear control systems. Topics include continuous and discrete descriptions of systems, time and frequency response, stability, system specification, system design of continuous and discrete systems. *Preq*: E C E 330. *Coreq*: E C E 495.

E C E 410, 610 Modern Control Theory 3(3,0) Introduction to modern control theory. Topics include fundamentals of matrix algebra, state space analysis and design, nonlinear systems and optimal control. *Preq*: E C E 409.

E C E 412 Electrical Machines Laboratory 1(0,2) Selected experiments which will help the student become familiar with characteristics of transformers, DC and AC motors and generators. Measurement techniques and component modeling will be included. *Coreq:* MTHSC 434 or consent of instructor. *Preq:* E C E 360 or 419.

E C E 416, 616 Electric Power Distribution System Engineering 3(3,0) Includes load characteristics, distribution transformers, design of transmission line and distribution substations, design of primary and secondary systems, capacitors in distribution systems, and power system harmonics. *Preq:* E C E 360.

E C E 417, 617 Elements of Software Engineering 3(3,0) Foundations of software design, reasoning about software, the calculus of programs, survey of formal specification techniques and design languages. *Preq:* E C E 329, MTHSC 419.

E C E 418, 618 Power System Analysis 3(3,0) Study of power system planning and operational problems. Subjects covered are load flow, economic dispatch, fault studies, transient stability and control of problems. System modeling and computer solutions are emphasized through class projects. *Preq:* E C E 360, 380.

E C E 419, 619 Electric Machinery 3(3,0) Performance and characteristics of AC and DC machines during steady-state and transient conditions. Coverage includes DC, induction, synchronous motors and alternators. Modeling and computer simulation are included. *Preq:* E C E 360, 380.

E C E 422, 622 Operational Amplifier Circuits 3(2,2) Analysis and design of circuits, both analog and digital, using operational amplifiers. *Preq:* E C E 321. *Coreq:* MTHSC 311 or 434.

E C E 423, 623 Power System Protection 3(3,0) Covers basic requirements of power system protection, relaying principles and the basic techniques of over current, distance, differential and carrier protection. Computer coordination and introduction to digital protection are introduced. *Preq:* E C E 418. *Coreq:* MTHSC 434 or consent of instructor.

E C E 426, 626 Digital Computer Design 3(3,0) Design of high-speed ALU's, control and timing circuitry, memory systems and I/O circuitry; microprogrammed computer design using bit-slice microprocessors; current hardware topics related to computer design; hands-on design experience; and use of logic analyzer for system debugging. *Preq:* E C E 371.

E C E 427 Communications Systems 3(3,0) Study of modulation techniques used in modern communications systems design, including continuous wave modulation (AM, FM, PM), analog and digital pulse modulation (PAM, PPM, PWM, PCM), and the impact of noise interference on these systems. *Preq:* E C E 317, 330. *Coreq:* MTHSC 434.

E C E 428, 628 Modulation and Noise 3(3,0) Course covering the modulation techniques used in modern communication systems. Topics covered are spectral translations, stochastic description of signals and noise, correlation functions, power spectra, amplitude modulation, frequency and phase modulation, pulse amplitude modulation,

and impact of noise on systems employing these types of modulation. *Preq:* E C E 330, E C E 317 or MTHSC 400, MTHSC 311 or 434, or consent of instructor.

E C E 429, 629 Organization of Computers 3(3,0) Course in computer organization and architecture. Topics include a review of logic circuits, bus structures, memory organization, interrupt structures, arithmetic units, input-output structures, state generation, central processor organization, control function implementation, and data communication. Registered Transfer Language (RTL) for description and design of digital systems. *Preq:* CP SC 230 or E C E 250 or 272 or consent of instructor.

E C E 430, 630 Introduction to Digital Communications 3(3,0) Course in modern digital communications theory. Topics covered are discrete time signals, discrete Fourier transforms, channel bandwidth, channel distortion, coding of analog information, data signal encoding, introduction to decision theory, matched filter, baseband systems, AM, FM, PM, phase-locked loops, secure communications and contemporary communications systems. *Preq:* E C E 317 or MTHSC 400, E C E 330, MTHSC 311 or 434, or consent of instructor.

E C E 431, 631 Digital Electronics 3(2,2) Electronic devices and circuits of importance to digital computer operation and to other areas of electrical engineering are considered. Active and passive waveshaping, waveform generation, memory elements, switching, and logic circuits are some of the topics. Experimentation with various types of circuits is provided by laboratory projects. *Preq:* E C E 321. *Coreq:* MTHSC 311 or 434.

E C E 432, 632 Instrumentation 3(3,0) Theory and analysis of transducers and related circuits and instrumentation. Generalized configurations and performance characteristics of instruments will be considered. Transducer devices for measuring physical parameters such as motion, force, torque, pressure, flow, and temperature will be discussed. *Preq:* E C E 321. *Coreq:* MTHSC 311 or 434.

E C E 433, 633 Sensors and Microcomputer Control for Robots 3(1,4) Study of current robotics technology with emphasis on robots suitable for industrial applications that require locomotion and sophisticated sensors. Class design project will be coordinated to produce a working modular robot. *Preq:* E C E 302 or 409, 371 or consent of instructor.

E C E 434, 634 Power Electronics 3(3,0) Study of electronic devices and systems which are designed to control or regulate large amounts of power. Included are SCR applications to inverters, motor controls, high-current switching systems, voltage stabilizers, and other power applications of electronics are also considered. *Preq:* E C E 321, 360. *Coreq:* MTHSC 434 or consent of instructor.

E C E 436, 636 Transmission Lines and Microwave Circuits 3(3,0) Study of the theoretical and practical aspects of transmission lines and waveguides. Smith Chart applications and design impedance matching networks, scattering parameters, interconnection and design of multiports. *Preq:* E C E 381 or equivalent. *Coreq:* MTHSC 311 or 434.

E C E 438, 638 Computer Communications 3(3,0) Digital data transmission techniques, modems and communications channels, communications software and protocols, multiprocessors and distributed processing. Concurrence and cooperation of dispersed processors. *Preq:* Senior standing in Electrical or Computer Engineering or Computer Science or consent of instructor.

E C E 439, 639 Fiber Optics 3(3,0) The underlying principles of design for optical fibers in practical systems are covered. Optical fiber as a waveguide is examined using wave optics and ray optics. Design criteria for using mono- and multi-mode fibers are discussed. Other topics include fabrication, measurement. *Preq:* E C E 380, 381, PHYS 222. *Coreq:* MTHSC 311, 434, or consent of instructor.

E C E 440, 640 Performance Analysis of Local Computer Networks 3(3,0) Introduction to the design and performance analysis of local computer networks. Emphasis is placed on performance analysis of representative multi-access procedures. Three common types of networks are considered in detail. *Preq:* E C E 272, 317 or MTHSC 400 or equivalent.

E C E 442, 642 Knowledge Engineering 3(3,0) Introduction to the theoretical and practical aspects of knowledge engineering or applied artificial intelligence. Topics to include symbolic representation structures and manipulation, unification, production systems and structures, rule-based and expert systems, planning and AI system architectures. System design in PROLOG and LISP. Project required. *Preq:* E C E 201; MTHSC 419 or consent of instructor. *Coreq:* E C E 329.

E C E 446, 646 Antennas and Propagation 3(3,0) Study of the theoretical and practical aspects of antenna design and utilization, input impedances, structural considerations and wave propagation. *Preq:* E C E 330, 381 or 436, MTHSC 311 or 434.

E C E 452, 652 Programming Systems 3(3,0) A second course in programming languages and systems. Topics include assemblers, compilers and syntactical methods; string manipulation and list processing; concepts of executive programs and operating systems; introduction to time-sharing systems. *Preq:* E C E 329, MTHSC 419.

E C E 453, 653 Software Practicum 3(1,6) The student must design and implement a software system that satisfies both a requirements and specifications document. The resulting system will be tested for compliance. *Preq:* E C E 417.

E C E (M E) 456, 656 Design and Application of Industrial Robots 3(3,0) See M E 456.

E C E 459, 659 Integrated Circuit Design 3(2,2) Design concepts and factors influencing the choice of technology. Fundamental MOS device design. Silicon foundries, custom and semicustom integrated circuits. Computer-aided design software/hardware trends and future developments. Hands-on use of CAD tools to design standard library cells. Systems design considerations, testing, and packaging. *Preq:* E C E 321. *Coreq:* MTHSC 311 or 434.

C E 460 Computer-Aided Analysis and Design 3(3,0) Principles and methods suited to the solution of engineering problems on the digital computer. Topics include widely used methods for the solution of the systems of algebraic and/or differential equations which arise in modeling of engineering systems, data approximation and curve fitting, continuous system simulation languages, and design-oriented programming systems. *Preq:* E C E 262, MTHSC 311, 434, or consent of instructor.

C E 467, 667 Introduction to Digital Signal Processing 3(3,0) Introduction to characteristics, design, and applications of discrete time systems. Design of digital filters. Introduction to the Fast Fourier Transform (FFT). LSI hardware for signal processing applications. *Preq:* E C E 330.

C E 468, 668 Embedded Microprocessor 3(2,2) Interfacing, architecture, and design issues which arise when the microprocessor is embedded in electromechanical and human systems. Applications and design projects include guidance systems, robotics, process control, artificial limbs, etc. *Preq:* E C E 302 or 330 or 409 and 371, MTHSC 311 or 434 or consent of instructor.

C E H491 Undergraduate Honors Research 1-6 Individual research projects to be conducted under the direct supervision and guidance of a faculty member. May be repeated for a maximum of six credits.

C E 492, 692 Special Problems 1-3(0,2) Special assignment in electrical or computer engineering. Some typical assignments include computer programs, term papers, technical literature searches, hardware projects, and design project leadership. May be taken only once for credit.

C E 493, 693 Selected Topics 1-3(1-3,0) Classroom study of current and new technical developments in electrical and computer engineering. Course may be repeated for a maximum of six credit hours, but only if different topics are covered. *Preq:* Consent of instructor.

C E 495 Integrated System Design I 2(1,3) Engineering design of systems is considered in a continuous process of project definition, planning, execution, and evaluation. This process includes consideration of both technical and non-technical factors in design. A strong emphasis is placed on the development of effective technical communications skills, particularly oral communications competency. *Preq:* E C E 321, 330, 360, 371, 381 (three of which must have been completed prior to enrollment, with the remaining taken as corequisite courses). *Coreq:* E C E 409 (in addition to any deficit courses in the prerequisites).

C E 496 Integrated System Design II 2(0,6) Project-oriented course which brings together electrical engineering students of dissimilar training into teams or project groups. Assignments are made to each group which are designed to help develop an appreciation for individual and creative thinking as well as team effort. *Preq:* E C E 321, 330, 360, 371, 381, 409, 495.

ENGINEERING

Professor: W. F. Beckwith, *Director; Associate Professors:* J. L. Josey, W. J. Park

ENGR 101 Introduction to Engineering 1(0,2)

Students are introduced to the engineering profession and engineering disciplines for the purpose of assisting students in their selection of an engineering major. Professional ethics, technical communications, word processing, and electronic communications are taught.

ENGR 110 Engineering Problems Workshop 1(0,2) Workshop devoted to the analysis and solution of engineering-oriented problems. Representative problems taken from the different fields of engineering will be used to illustrate such analytical and problem-solving techniques as estimation and approximation, numerical aids to computation, and solutions by graphical methods.

ENGR 120 Engineering Problem Solving and Design 3(1,4) Methodology and practice of engineering problem solving and engineering design. Selected computer tools, teamwork, and communication modes are employed. Ethics, safety, economics, and environmental concerns are considered. *Preq:* ENGR 101, MTHSC 106. *Coreq:* PHYS 122.

ENGR 150 Introduction to Materials 1(1,0) Introduction to materials used in modern technology. Different materials (metals, ceramics, and polymers) and different forms (bulk, fibers, gels, thin films, etc.) will be discussed in the context of their application to consumer products, structural composites, refractories, biomedical implants, and electronic and optical materials. *Preq:* Enrollment in General Engineering or consent of instructor.

ENGR 180, H180 Computers in Engineering 3(2,3) Introduction to the use of computers in engineering analysis, design, and communications. A high-level programming language and other software are used on microcomputers. *Preq:* Engineering major; knowledge of a computer language. *Coreq:* MTHSC 106.

ENGINEERING GRAPHICS

Professor: V. B. Anand; *Assistant Professor:* L. C. Cleveland; *Visiting Instructor:* A. C. Balch

E G 208 Engineering Graphics with Computer Applications 3(2,3) Course designed for the introduction of basic concepts in engineering graphics as a means of communication. Areas of study include theory of orthographic projections, descriptive modeling, and computer graphics. *Preq:* ENGR 180.

E G 209 Introduction to Engineering/Computer Graphics 2(1,3) Designed for the introduction of basic graphical concepts needed for engineering application, including orthographic projections, descriptive modeling, and computer graphics. *Preq:* ENGR 120 or permission of instructor.

E G 412, 612 Interactive Computer Graphics 3(3,0) Graphics hardware and display technology. Reduction and presentation of engineering data. Techniques of geometrical transformations, perspective and model manipulation. Methodology of computer-aided design. Application of higher-level software to engineering problems. *Preq:* E G 208 and MTHSC 208 or consent of instructor.

E G 490, 690 Special Topics in Engineering and Computer Graphics 1-3(1-3,0) Comprehensive study of any computer-aided topic in engineering graphics not covered in other courses. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

¹Credit toward a degree will be given for only one of the following: E G 208, 209.

ENGINEERING MECHANICS

Professors: S. C. Anand, S. B. Biggers, R. H. Brown, J. G. Goree, E. H. Law, R. F. Nowack, B. L. Sill, P. R. Sparks; *Associate Professor:* J. M. Kennedy; *Assistant Professors:* P. F. Joseph, T. A. Reinhold, S. D. Schiff, L. L. Thompson

E M 201, H201 Engineering Mechanics: Statics 3(3,0) Forces and force systems and their external effect on bodies, principally the condition of equilibrium. The techniques of vector mathematics are employed, and the rigor of physical analysis is emphasized. *Preq:* PHYS 122, MTHSC 206 (or concurrent enrollment).

E M 202, H202 Engineering Mechanics: Dynamics 3(3,0) Continuation of E M 201. The principal topics are kinematics and kinetics of particles and rigid bodies of finite size. Techniques of vector mathematics are employed. *Preq:* E M 201, MTHSC 206.

E M 304, H304 Mechanics of Materials 3(3,0) The relationships between external loads on solid bodies or members and the resulting internal effects and dimension changes, including the derivation of rational formulas for stresses and deformations and the identification and use of important mechanical properties of engineering materials. *Preq:* E M 201, MTHSC 206.

E M 305 Mechanics of Materials Laboratory 1(0,3) Theoretical relationships considered in E M 304 are verified. Students observe the behavior under load and the failure of engineering materials; identify and evaluate mechanical properties of materials important to design and manufacturing processes; and are acquainted with various testing methods; testing machines, and instruments. *Preq:* E M 304 or C E 220 (or concurrent enrollment); E M 201.

E M 320, H320 Fluid Mechanics 3(3,0) The behavior of fluids at rest or in motion, including the study of fluid properties. Emphasis is placed upon a rational, analytical approach from which are developed basic principles of broad applicability to all fields of engineering. *Preq:* E M 202.

E M 322 Fluid Mechanics Laboratory 1(0,3) The principles of incompressible fluid mechanics are verified and demonstrated. Familiarization with orderly techniques in organizing and reporting results of experimental investigations and with the use of instruments and equipment is afforded. *Preq:* Must be accompanied or preceded by E M 320 or C E 340.

E M 425, 625 Advanced Strength of Materials 3(3,0) Topics in strength of materials not covered in E M 304. Three-dimensional stress and strain transformations, theories of failure, shear center, unsymmetrical bending, curved beams, and energy methods. Other topics such as stress concentrations and fatigue concepts are treated as time permits. *Preq:* E M 304.

E M 430, 630 Mechanics of Composite Materials 3(3,0) Fundamental relationships for predicting the mechanical and thermal response of multilayered materials and structures are developed. Micromechanical and macromechanical relationships are developed for laminated materials with emphasis on continuous filament composites. The unique nature of composites and the advantages of designing with composites are discussed. *Prq:* E M 304.

E M 450, 650 Mechanical Vibrations 3(3,0) Mathematical analysis of physical problems in the vibration of mechanical systems. Topics include linear-free vibrations, forced vibrations, and damping in single degree of freedom systems, transient vibrations, critical speeds and whirling of rotating shafts, dynamic balancing, and multidegree of freedom systems with lumped parameters. *Prq:* E M 202, 304, MTHSC 208.

ENGLISH

Professors: J. R. Andreas, H. B. Bryant, F. L. Day, Chair; S. K. Eisinger, G. W. Koon, R. W. Moran, R. B. Palmer, F. W. Shilstone, M. S. Steadman, R. A. Underwood, C. M. Ward, D. H. Winchell, M. R. Winchell, C. H. Woodell, A. P. Young; *Associate Professors:* R. E. Barfield, D. G. Bzdyl, W. K. Chapman, M. J. Charney, B. Daniell, K. J. H. Dettmar, M. J. Jacobi, C. E. Johnston, C. R. Lovitt, L. W. Rollin, D. C. Tillinghast, E. P. Willey; *Assistant Professors:* A. Bennett, C. A. Collier, T. G. Hill, S. J. Hilligoss, T. W. Howard, J. M. Kuehn, A. L. Low, L. J. Morrissey, E. K. Sparks, D. R. White; *Instructors:* J. M. Bailey, M. C. Barton, R. L. Elkins, M. L. Farmer, T. A. Fishman, J. R. Geist, E. B. Herling, L. L. Higgs, M. E. Land, M. Lirola, C. R. Love, E. J. Marshall, L. D. McCleary, D. R. Novotny, C. C. Ochterbeck, B. G. Powell, M. T. Reilly, A. F. Santavirta, H. R. Shealy, S. H. Smith; *Lecturers:* C. A. Benson, *Research Associate:* C. L. Holt, *Research Associate:* B. J. Ramirez, S. S. Titus, M. L. Walker; *Visiting Instructors:* W. M. Bisese, I. B. Hill, J. M. Perkins, D. R. Phillips, S. C. Tekulve

ENGL 100 English Fundamentals 3(3,0) Drill in basic writing skills: mechanics, spelling, syntax, usage, dialect, sentence clusters, and paraphrasing. Required of all freshmen who do not make a satisfactory score on the SAT verbal. Carries no credit for graduation.

ENGL 101, H101 Composition I 3(3,0) Training in correct and effective expression in brief expository essays; review of the fundamentals of grammar and punctuation; instruction in common expository methods.

ENGL 102, H102 Composition II 3(3,0) Continued emphasis on correct and effective expression; training in the organization and writing of the research report. *Prq:* ENGL 101.

ENGL 111 English as a Second Language 3(3,2) Special course for students learning English as a second language. Intensive study and drill in American English pronunciation and listening comprehension. Required of all foreign students who do not make a satisfactory grade on screening examination in oral English. To be taken Pass/Fail only. Carries no credit for graduation.

ENGL 190 The Study of English 1(1,0) Orientation to the study of English language and literature and to the sources and methods of literary research. Required of all English majors and recommended for minors.

ENGL 202, H202 The Major Forms of Literature 3(3,0) Study of the basic structures and elements of fiction, poetry, and drama, including literary and critical theory, with readings in American, British, and world literature. Proficiency in composition must be demonstrated. *Prq:* ENGL 102.

ENGL 203, H203 Survey of English Literature I 3(3,0) Chief British authors and works from Beowulf to the Romantic period. Proficiency in composition must be demonstrated. *Prq:* ENGL 102.

ENGL 204, H204 Survey of English Literature II 3(3,0) Chief British authors and works from the Romantic period to 1945. Proficiency in composition must be demonstrated. *Prq:* ENGL 102.

ENGL 205, H205 Survey of American Literature I 3(3,0) American literature to the Civil War, with emphasis on major writers. Proficiency in composition must be demonstrated. *Prq:* ENGL 102.

ENGL 206, H206 Survey of American Literature II 3(3,0) American literature from the Civil War to 1945, with emphasis on major writers. Proficiency in composition must be demonstrated. *Prq:* ENGL 102.

ENGL 207, H207 Survey of World Literature I 3(3,0) Translations of continental European literature from Homer to the Renaissance (together with some Asian classics), with emphasis on major authors. Proficiency in composition must be demonstrated. *Prq:* ENGL 102.

ENGL 208, H208 Survey of World Literature II 3(3,0) Translations of continental European literature from the 17th century to the present (together with some Asian classics), with emphasis on major writers. Proficiency in composition must be demonstrated. *Prq:* ENGL 102.

ENGL 209, H209 Contemporary Literature 3(3,0) Study of selected writers since 1945, primarily British and American. Proficiency in composition must be demonstrated. *Prq:* ENGL 102.

ENGL H210 Introduction to Literary Study 3(3,0) A literature and composition course for honors students who have exempted ENGL 101 and 102. Readings in American, English, and world literature and advanced training in writing and research. *Prq:* Exemption from ENGL 101 and 102 or consent of the instructor.

ENGL 217 Vocabulary Building 3(3,0) Development of a useful discriminating vocabulary for writing, speaking, and reading. Student notebooks and proficiency quizzes. *Prq:* ENGL 102.

ENGL 231 Introduction to Journalism 3(3,0) Instruction and practice in writing for mass media; editorial responsibilities. *Prq:* ENGL 102.

ENGL 300 Introduction to Linguistics 3(3,0) Introduction to general linguistic principles. A survey of the biological, structural, and social aspects of language. *Prq:* Sophomore standing.

ENGL 304 Business Writing 3(3,0) An introduction to business writing: memoranda, letters, reports, and research methods. *Prq:* Junior standing.

ENGL 312 Advanced Expository Writing 3(3,0) A workshop in practical writing focusing on principles and style. *Prq:* Sophomore literature or consent of instructor.

ENGL 314 Technical Writing 3(3,0) [W.3] Intensive training in the fundamentals of technical writing: reports, letters, and memoranda. *Prq:* Junior standing.

ENGL 316 Writing and International Trade 3(3,0) [W.3] Students will complete projects demanding a variety of communications skills that professionals in international trade need; sensitivity to foreign audiences and cultures in oral and written communication, electronic and graphic communication, collaborative writing and management. *Prq:* Sophomore literature.

ENGL 331 Publications Workshop 1(1,0) Workshop designed for students who serve on student publication staffs. This course emphasizes the responsibilities of staff members. May be repeated for a maximum of three credits. *Prq:* ENGL 102 and consent of the instructor.

ENGL 333 Reporting for the News Media 3(3,0) [W.3] Practical experience in gathering and writing news and feature copy for the media, concentration on print journalism; examination of the role of the modern journalist; laws governing the profession; journalistic ethics. *Prq:* ENGL 231 or consent of instructor.

ENGL 334 Feature Writing 3(3,0) [W.3] Practical experience in writing feature articles for newspapers, magazines, and free-lance markets. *Prq:* ENGL 231 or consent of instructor.

ENGL 335 Editing for Newspapers 3(3,0) Examination of the editing process of newspapers and magazines. Practical experience in article selection, copy-editing, headline writing, and page design. *Prq:* ENGL 231 or consent of instructor.

ENGL 345 The Structure of Fiction 3(3,0) [W.3] Introduction to the creative writing and critical study of prose fiction. *Prq:* Sophomore literature or consent of instructor.

ENGL 346 The Structure of Poetry 3(3,0) An introduction to the creative writing and critical study of poetry. *Prq:* Sophomore literature or consent of instructor.

ENGL (THEA) 347 The Structure of Drama 3(3,0) See THEA 347.

ENGL 350 Mythology 3(3,0) A study of the great myths of the world with an emphasis on their applications to literature. *Prq:* Sophomore standing.

ENGL 351 American Folklore 3(3,0) Study of American folklore with an emphasis on such considerations as the folk tale, folk songs and ballads, folk heroes, and folk superstitions and remedies. *Prq:* Sophomore standing.

ENGL 353 Ethnic American Literature 3(3,0) A critical examination of essays, poetry, fiction, and drama written by members of a variety of American racial and ethnic groups, such as Native Americans, African-Americans, Chicano-Mexicans, Asian Americans, Italian Americans, and American Jews. *Prq:* Sophomore standing.

ENGL 355 Popular Culture 3(3,0) An examination of the nature, functions, history, and impact upon American society of best sellers, popular magazines, television, movies, and other like phenomena. *Prq:* Sophomore standing.

ENGL 356 Science Fiction 3(3,0) Readings in science fiction from the 17th century to the present, with special emphasis on writers since Verne and Wells. *Preq:* Sophomore standing.

ENGL 357 Film 3(2,3) Examination of the film medium as an art form: its history, how films are made, why certain types of films (western, horror movies, and so forth) have become popular, and how critical theories provide standards for judging film. *Preq:* Sophomore standing or consent of instructor.

ENGL 358 Advanced Studies in Film 3(2,3) Continued study of film theory and aesthetics, with applications of that knowledge to the making of a film or video. *Preq:* ENGL 357 or consent of instructor.

ENGL 359 Special Topics in Language, Literature, or Culture 3(3,0) Studies in varied topics not central to other English courses, such as Literature and Art/Business/Sports; Language and Style; Black Literature. Specific titles and course descriptions to be announced from semester to semester. May be repeated once with department chair's consent. *Preq:* Sophomore literature or consent of instructor.

ENGL H367 Special Topics for Honors Students 3(3,0) Varied topics of general interest in literature, language, rhetoric, or culture for all honors students. Specific topics announced from semester to semester. May be repeated for a maximum of nine credits. *Preq:* Sophomore literature.

ENGL 380 British and American Women Writers 3(3,0) Poetry, drama, fiction, and prose by established and little-known women writers in Britain and America. Particular attention to works treating themes and issues concerning women's lives. Readings on such topics as women and work, education, religion, creativity. *Preq:* Sophomore standing.

ENGL 385 Children's Literature 3(3,0) Reading and analysis in a wide range of authors, illustrators, and genres appropriate for children from preschool through eighth grade, classic as well as modern. Critical approaches include historical, thematic, and social. *Preq:* Sophomore standing.

ENGL 386 Adolescent Literature 3(3,0) [W.1] Reading and analysis of literature written for readers age 12–18. Emphasis on historical context, chief themes and motifs, and censorship issues, as well as connections with classic literature. *Preq:* Sophomore standing.

ENGL 400, 600 The English Language 3(3,0) Studies in English usage and the historical development of the language. *Preq:* Sophomore literature.

ENGL 401, 601 Grammar Survey 3(3,0) Survey of modern grammars with a focus on exploring the impact structural grammar has had on traditional grammar. Recommended for English teachers. *Preq:* Sophomore literature.

ENGL 403, 603 The Classics in Translation 3(3,0) An examination of Homer's *Iliad* and *Odyssey*, Virgil's *Aeneid*, and Ovid's *Metamorphoses*. A few shorter works by other Greek and Roman writers may also be read. *Preq:* Sophomore literature.

ENGL 404, 604 Classical Drama 3(3,0) Selected reading in the dramatic literature of classical Greece and Rome. *Preq:* Sophomore literature.

ENGL 405, 605 Studies in English Literature to 1700 3(3,0) Selected reading in English literature from the beginnings to 1700, with emphasis on social and intellectual backgrounds. *Preq:* Sophomore literature.

ENGL 406, 606 Studies in English Literature Since 1700 3(3,0) Selected readings in English literature from 1700 to the present, with emphasis on social and intellectual backgrounds. *Preq:* Sophomore literature.

ENGL 407, 607 The Medieval Period 3(3,0) Selected works of Old and Middle English literature, exclusive of Chaucer. *Preq:* Sophomore literature.

ENGL 408, 608 Chaucer 3(3,0) Selected readings in Middle English from *The Canterbury Tales* and other works by Chaucer. *Preq:* Sophomore literature.

ENGL 409, 609 The Earlier English Renaissance 3(3,0) Tudor and Elizabethan poetry, prose, fiction, translations, essays, and criticism. *Preq:* Sophomore literature.

ENGL 410, 610 Drama of English Renaissance 3(3,0) Selected readings in non-Shakespearean dramatic literature of the 16th and 17th centuries. *Preq:* Sophomore literature.

ENGL 411, 611 Shakespeare 3(3,0) A study of selected tragedies, comedies, and history plays of Shakespeare. Required of all English majors. *Preq:* Sophomore literature.

ENGL 412, 612 Studies in Shakespeare 3(3,0) Special topics in Shakespeare as selected by instructors. May be repeated once with department chair's consent. *Preq:* Sophomore literature.

ENGL 413, 613 Later English Renaissance 3(3,0) Nondramatic poetry and prose from Ben Jonson, John Donne, and Francis Bacon through Andrew Marvell and John Bunyan, excluding Shakespeare and Milton. *Preq:* Sophomore literature.

ENGL 414, 614 Milton 3(3,0) The development of Milton's art and thought from the minor poems and selected prose through *Paradise Lost*, *Paradise Regained*, and *Samson Agonistes*, set against the background of the late Renaissance. *Preq:* Sophomore literature.

ENGL 415, 615 The Restoration and Eighteenth Century 3(3,0) Readings in Dryden, Swift, Pope, and Dr. Johnson. *Preq:* Sophomore literature.

ENGL 416, 616 The Romantic Period 3(3,0) Readings from the poetry and critical prose of Blake, Wordsworth, Coleridge, Byron, Shelley, Keats, and other representative figures. *Preq:* Sophomore literature.

ENGL 417, 617 The Victorian Period 3(3,0) Reading from the poetry and nonfiction prose of selected Victorian authors, including works of Carlyle, Tennyson, Browning, Arnold, and other representative figures. *Preq:* Sophomore literature.

ENGL 418, 618 The English Novel 3(3,0) Study of the English novel from its 18th century beginnings through the Victorian Period. *Preq:* Sophomore literature.

ENGL 422, 622 American Literature I 3(3,0) Major American authors and movements from the Colonial period to the Civil War. *Preq:* Sophomore literature.

ENGL 423, 623 American Literature II 3(3,0) Major American authors and movements from the Civil War to the early 20th century. *Preq:* Sophomore literature.

ENGL 424, 624 American Literature III 3(3,0) Major American authors and movements of the 20th century. *Preq:* Sophomore literature.

ENGL 425, 625 The American Novel 3(3,0) A survey of the most significant forms and themes of the American novel from its beginnings to 1900. *Preq:* Sophomore literature.

ENGL 426, 626 Southern Literature 3(3,0) The intellectual and literary achievement of the South from 1607 to the present, with emphasis upon the writers of the 19th century. *Preq:* Sophomore literature.

ENGL 430, 630 Modern Drama 3(3,0) Principles and progress of drama from Ibsen to the present; analysis of representative plays; critical reports; discussion of trends in contemporary drama. *Preq:* Sophomore literature.

ENGL 431, 631 Modern Poetry 3(3,0) The modern tradition in English and American poetry from Yeats to the present; relevant critical essays. *Preq:* Sophomore literature.

ENGL 432, 632 Modern Fiction 3(3,0) American and British novels and short stories of the 20th century. *Preq:* Sophomore literature.

ENGL 433, 633 The Anglo-Irish Literary Tradition 3(3,0) Exploration of the unique literary heritage and achievement of English-language Irish writers in the 19th and 20th centuries. Major figures of the Irish tradition: W. B. Yeats, James Joyce, and Samuel Beckett, and other writers; consideration of the specifically Irish aspects of their works. *Preq:* Sophomore literature.

ENGL 434, 634 Environmental Literature 3(3,0) Survey of literature that examines the relationship between human beings and the natural world, including analysis of environmental themes in myths and legends and in selected poetry and prose of nineteenth- and twentieth-century England and America. *Preq:* Sophomore literature or consent of instructor.

ENGL 435, 635 Literary Criticism 3(3,0) Major critical approaches to literature. *Preq:* Sophomore literature.

ENGL 436, 636 Feminist Literary Criticism 3(3,0) Introduction to the germinal works of feminist literary theory and criticism. Outlines the development of modern literary criticism by studying feminist versions of the major critical methodologies. *Preq:* Sophomore literature or consent of instructor.

ENGL 437, 637 Directed Studies I-3(1-3,0) Class and tutorial work for students with special interests or projects in American, British, or European literature outside the scope of existing courses. Applications must be approved during the early registration period of the semester preceding the one in which directed studies will occur. May be repeated by arrangement with the department. *Preq:* Junior standing and approved registration.

ENGL H438 Departmental Honors Research 3(3,0) Research for the preparation of an honors project. *Preq:* Second-semester Junior standing and the approval of the English Honors Committee.

- ENGL H439 Departmental Honors Project 3(3,0)** Preparation of an honors project. *Preq:* ENGL H438 and first semester Senior standing.
- ENGL 445, 645 Fiction Workshop 3(3,0)** A workshop in the creative writing of prose fiction. May be repeated once for credit. *Preq:* ENGL 345 or consent of instructor.
- ENGL 446, 646 Poetry Workshop 3(3,0)** A workshop in the creative writing of poetry. May be repeated once for credit. *Preq:* ENGL 346 or consent of instructor.
- ENGL (THEA) 447, 647 Playwriting Workshop 3(0,3)** See THEA 447.
- ENGL 450, 650 Film Genres 3(2,3)** Advanced study of films that have similar subjects, themes, and techniques, including such genres as the Western, horror, gangster, science fiction, musical, and/or screwball comedy. Course will also consider nontraditional genres, screen irony, genre theory, and historical evolution of genres. Topics vary. *Preq:* ENGL 357 or consent of instructor.
- ENGL 451, 651 Film Theory and Criticism 3(2,3)** Advanced study into the theory of film/video making with an emphasis on understanding a variety of critical methods to approach a film. Course examines the history of film theory and defines the many schools of film criticism, including realism, formalism, feminism, semiotics, Marxism, and expressionism. *Preq:* ENGL 357 or consent of instructor.
- ENGL 452, 652 Great Directors 3(2,3)** Intensive study of one to three film directors with an emphasis on understanding the entire canon of each director. Students will study similarities in techniques, shifts in thematic emphasis, and critical methodologies for approaching the works of each director. Topics vary. *Preq:* ENGL 357 or consent of instructor.
- ENGL 453, 653 Sexuality and the Cinema 3(2,3)** Examination of male/female sexual roles and their evolution in American genre films, avant-garde cinema, and international films. Course will include the study of movies in relation to cultural values and social stereotypes, introduction to feminist film theory, and consideration of film morphology. *Preq:* ENGL 357 or consent of instructor.
- ENGL 455, 655 American Humor 3(3,0)** Native American humor of the 19th and 20th centuries. *Preq:* Sophomore literature.
- ENGL 459, 659 Advanced Special Topics in Language, Literature, or Culture 3(3,0)** Advanced studies in topics not central to other English courses, such as certain authors, works, genres, themes, or areas of knowledge and culture. Specific topics will be announced when offered. May be repeated once for credit with department chair's consent. *Preq:* Sophomore literature.
- ENGL 482, 682 African American Fiction and Nonfiction 3(3,0)** Critical examination of the various forms and genres of African American prose including the novel, short fiction, autobiography, nonfiction, and oratory with some attention to emerging theories about African American culture and its impact on American cultural life in general. *Preq:* Sophomore literature.
- ENGL 483, 683 African American Poetry, Drama, and Film 3(3,0)** Studies in the various forms, themes, and genres of African American

- poetry, drama, and film with some attention to emerging theories about African American culture and its impact on American cultural life in general. *Preq:* Sophomore literature.
- ENGL 485, 685 Composition for Teachers 3(3,0)** Practical training in teaching composition: finding workable topics, organizing and developing observations and ideas, evaluating themes, and creative writing. *Preq:* Sophomore literature.
- ENGL 490, 690 Advanced Technical and Business Writing 3(3,0)** Advanced work in writing proposals, manuals, reports, and publishable articles. Students will produce work individually and in groups. *Preq:* ENGL 304 or 314 or consent of instructor.
- ENGL (SPCH) 491, 691 Classical Rhetoric 3(3,0)** Study of the major texts in classical rhetoric. This course examines the nature and functions of rhetoric in Greek and Roman societies. It traces the development of rhetoric from Protagoras through Isocrates, Plato, Aristotle, Cicero, and Quintilian, and considers questions essential to understanding persuasive theory and practices. *Preq:* Sophomore literature or consent of instructor.
- ENGL (SPCH) 492, 692 Modern Rhetoric 3(3,0)** Examines the "new rhetorics" of the 20th century, which are grounded in classical rhetoric but which include findings from biology, psychology, linguistics, and anthropology, among other disciplines. It considers the theories and applications of communication. *Preq:* Sophomore literature or consent of instructor.
- ENGL 495, 695 Technical Editing 3(3,0)** Practical experience in editing and preparing technical manuscripts for publication. General introduction to the functions of the technical editor. *Preq:* ENGL 304, 314, or consent of instructor.

ENTOMOLOGY

Professors: P. H. Adler, D. R. Alverson, T. M. Brown, G. R. Carner, J. D. Culin, C. S. Gorsuch, R. P. Griffin, *Interim Chair*; J. C. Morse, R. Noblet, P. A. Zungoli; *Associate Professor:* W. M. Hood; *Assistant Professor:* H. W. Fescemyer

- ENT 200 Insects 2(2,0)** Introduction to insects; their various relationships with man, other animals and plants. The general nature of this course makes it beneficial to all students regardless of specialty. Closed to students who have had ENT 301 or equivalent.
- ENT 201 Current Topics in Entomology 1(1,0)** Discussion course covering topics dealing with insects and related arthropods. Subjects will be chosen to reflect issues of current interest as well as those having significance in human history. May be repeated for a maximum of three credits.
- ENT 300 Environmental Entomology 3(3,0)** Exploration of the diversity and roles of insects in natural and affected environments, the impact of insects and pesticides on environmental quality, and discussion of environmental ethics in entomological science. *Preq:* Any biological or physical science.
- ENT 301 General Entomology 4(3,3)** Introduction to the study of insects, with emphasis on their structure, function, ecology, and behavior. Identification of commonly encountered species is highlighted. Relationships between insect and human

- populations are discussed. Control technologies are introduced, with emphasis on environmentally responsible tactics.
- ENT 305 Presentation of Scientific Information 3(2,2) [O.2]** Instruction and practice in delivering oral presentations of scientific information and preparing visual aids. Emphasis is placed on oral scientific presentations for various target groups including scientists, service technicians, growers, amateur enthusiasts, the general public, and other audiences in which scientific information is transferred.
- ENT 308 Apiculture 3(2,3)** Even-numbered years. A detailed study of the honey bee and its economic importance in pollination and honey production. Attention will be given to bee behavior, colony management, equipment, honey-plant identification, and honey production and processing. *Preq:* BIOL 104 and consent of instructor.
- ENT 355 Veterinary Entomology 3(2,3)** Even-numbered years. Study of the biology, identification, damage and management of arthropod pests of veterinary importance and their role in transmission of diseases in animals, principally domestic livestock and poultry. Students will learn both the theoretical and practical aspects of integrated management of arthropod pests of livestock and poultry. *Preq:* Junior standing.
- ENT 401, H401, 601 Insect Pests of Ornamental Plants and Shade Trees 3(2,3)** Odd-numbered years. Recognition, biology, damage and control of insect pests of woody and other ornamental plants and shade trees. *Preq:* ENT 301.
- ENT 404, H404, 604 Urban Entomology 3(2,3)** Even-numbered years. Study of pests common to the urban environment with emphasis on biology, damage, control, and identification of household, structural, stored products, and food pests. Students will learn both theoretical and practical aspects of urban pest management and the pest-control industry. *Preq:* ENT 301.
- ENT 405, H405, 605 Insect Morphology 4(3,3)** Even-numbered years. A study of insect structure in relation to function and of the variation of form in insects. *Preq:* ENT 301.
- ENT (PLPA) 406, H406, 606 Diseases of Insects and Turfgrasses 3(2,3)** See PLPA 406.
- ENT 407 Applied Agricultural Entomology 4(3,3)** Even-numbered years. Topics covered are the recognition, biology, damage and control of economically important insects and mites found on major Southeastern field, fruit, nut and vegetable crops. The principles and practices of crop protection, including pesticide application, economic basis for pest control, and development of scouting programs will be introduced. *Preq:* ENT 301 or equivalent.
- ENT 410, 610 Insect Taxonomy 3(1,6)** Odd-numbered years. The identification of the principal families of the major orders of adult insects. Laboratory work consists of intensive practice of such identification; lecture material deals with theoretical discussion of taxonomic features observed in the laboratory. *Preq:* ENT 405 or consent of instructor.
- ENT 412, 612 Field and Museum Entomology 3(0,9)** Practical aspects of gathering, sorting, and curating insects. Students participate in intensive overnight insect-collecting expeditions to various

parts of the Southeastern United States, becoming acquainted with insect habitats and collecting methods. The remainder of the summer session will be devoted to training in specimen preparation and preservation. *Preq:* Consent of instructor.

ENT 420, 620 Toxicology of Insecticides 3(2,3)S Odd-numbered years. Concepts of insecticide toxicology; principles of insecticide action; toxicological and pharmacological effects in insects and higher animals, safety, current regulations governing the use of insecticides. *Preq:* ENT 301.

ENT (ENTOX) 430, 630 Toxicology 3(3,0)F Odd-numbered years. Basic principles of toxicology including quantitation of toxicity, toxicokinetics, biochemical action of poisons, and environmental toxicology are studied. Acute and chronic effects of various classes of poisons (e.g., pesticides, drugs, metals, and industrial pollutants) are discussed in relation to typical routes of exposure and regulatory testing methods. *Preq:* Organic Chemistry, one year of general biology, or consent of instructor.

ENT 440, 640 Insect Behavior 3(2,3)F Odd-numbered years. Fundamentals of insect behavior in an evolutionary and ecological perspective. Laboratories emphasize generation and testing of hypotheses and observation, description, and quantification of insect behavior. *Preq:* ENT 301 or consent of instructor.

ENT 455, H455, 655 Medical and Veterinary Entomology 3(2,3)S Even-numbered years. Insects and their arthropod relatives which are of economic importance in their effect on man and animals. *Preq:* ENT 301 or consent of instructor.

ENT 461 Directed Research in Entomology 1-3(0,3-9) Development of a senior thesis based on a research problem in a selected entomological area. Emphasis will be placed on integrating the knowledge gained in the student's program with the results of the research project. May be repeated for a maximum of three credits. *Preq:* Senior standing and consent of instructor.

ENT 462, 662 Seminar 1(1,0) Literary search and oral presentation of current entomological topics. More than one presentation may be required. Course may be repeated for credit.

ENT (W F B) 469, H469, 669 Aquatic Insects 3(1,6)S Odd-numbered years. Identification, life history, habitats, and interrelationships of aquatic insects; techniques of qualitative field collecting; important literature and research workers. *Preq:* ENT 301 or consent of instructor.

ENT 470, H470, 670 Insect Physiology 3(2,3)S Odd-numbered years. Introduction to the physiological systems of insects, including structure as related to function. Emphasis will be on digestion, nutrition, reproduction, respiration, excretion, and nervous and hormonal systems as they affect growth and development in insects. *Preq:* ENT 301 or consent of instructor.

ENT 480, H480, 680 Insect Pathology 3(2,3)S Even-numbered years. Study of insect diseases including those caused by viruses, rickettsiae, bacteria, fungi, protozoa, and nematodes will be covered in this course. The effects of diseases on insect populations and the use of pathogens in insect control will also be considered in detail. *Preq:* ENT 301 or consent of instructor.

ENT 490 Practicum 1-4 Supervised entomological learning opportunity providing highly individualized experiences to complement other programs and courses. Must be prearranged at least two months in advance. Must file written report midway during enrollment period and at its conclusion. Must appear for oral evaluation at the end of the period. *Preq:* Junior standing and consent of instructor.

ENT 495 Insect Biotechnology 3(3,0)S Odd-numbered years. Considers many unique genetic features exhibited by insects and describes the applications of biotechnology to enhance useful products from insects and to affect the control of destructive insects. *Preq:* ENT 301, GEN 302.

ENVIRONMENTAL SCIENCE AND POLICY

Professors: E. M. Baines, S. R. Chapman, A. W. Elzerman, *Director;* R. E. Franklin, W. H. Leonard, J. E. Schindler, T. B. Yandle, Jr.; *Associate Professors:* B. W. Pinkerton, W. F. Steirer, Jr.; *Assistant Professor:* A. E. Miller

EN SP 200 Introduction to Environmental Science 3(3,0) Basic principles of environmental science including ecology, energy, resources, waste management; and air, water, and soil pollution. Consideration of issues, specific cases, investigative approaches and remedial actions. *Preq:* Sophomore standing and either two semesters of freshman chemistry or biology.

EN SP (AGRIC) 315, H315 Environmental and Agriculture 3(3,0) See AGRIC 315.

EN SP 400 Studies in Environmental Science 3(3,0) Study of historical perspectives, attitudes, and government policy within the framework of environmental case studies to illustrate the interaction between human and natural factors as they mutually affect the environment and man's ability to deal with that environment. *Preq:* EN SP 200 or consent of instructor.

EN SP 431, 631 Public Health Administration 3(3,0) A course designed to prepare one for a career in the environmental sciences, with positions in public health and pollution control. Topics included are public health organizations and regulations, public relations, psychology of public health administration, and the use of the communications media in educating the public on health problems.

EN SP 432 Inspection Methods in Water and Solid Waste 3(2,3) Methods of disposal of liquid and solid wastes will be emphasized in regard to environmental quality control. Treatment plant methods will be discussed. Inspection techniques for adequate treatment is a basic approach.

EN SP 471, 671 Man and His Environment 2(2,0) The interaction of man with his environment will be surveyed. Factors such as urbanization, population growth, pathogens, disease vectors, ionizing radiation, sewage disposal, and noise control will be considered. The effects of environmental contacts with air, water, food, and solid and liquid wastes will be emphasized. *Preq:* Consent of instructor.

EN SP 472, 672 Environmental Planning and Control 2(2,0) Application of planning and control to effective environmental quality improvement. Water supply and treatment, wastewater treatment and disposal, solid waste disposal, air pollution abatement, and land use and zoning will be considered from the standpoint of control. Not intended for graduate students in engineering. *Preq:* Consent of instructor.

ENVIRONMENTAL SYSTEMS ENGINEERING

Professors: G. T. Daigger, *Chair;* A. W. Elzerman, R. A. Fjeld, C. P. L. Grady, Jr., J. C. Jennett, T. M. Keinath, F. J. Molz, T. J. Overcamp, R. K. White; *Assistant Professors:* T. A. DeVol, C. M. Lee; *Research Associates:* J. T. Coates, F. M. Dunnivant, B. S. Magbanua, M. Newman, M. S. Rees, J. L. Resce

E S E 401, 601 Environmental Engineering 3(3,0) Introduction to the field of environmental engineering. Topics include environmental phenomena, impact of pollutants in the aquatic environment, solid-waste management, air pollution control, radiological health, and simple water and wastewater treatment systems. *Preq:* Junior standing in engineering or consent of instructor. *Coreq:* E M 320 or consent of instructor.

E S E 402, 602 Water and Waste Treatment Systems 3(3,0) A study of the fundamental principles, rational design considerations, and operational procedures of the unit operations and processes employed in water and waste treatment. Both physicochemical and biological treatment techniques will be discussed. An introduction to the integration of unit operations and processes into water and waste treatment systems. *Preq:* E M 320 or consent of instructor.

E S E (AG E, AGRON) 408, 608 Land Treatment of Wastewater and Sludges 3(3,0) See AGRON 408.

E S E 410, 610 Environmental Radiation Protection 1 3(3,0) Fundamental principles of radiological health and radiation safety. Topics include radiation fundamentals, basic concepts of environmental radiation protection, internal and external dosimetry, environmental dose calculations and radiation protection standards. *Preq:* Consent of instructor.

E S E 411, 611 Ionizing Radiation Detection and Measurement 2(1,3) Laboratory exercises in ionizing radiation measurements. Topics include nuclear electronics; counting statistics; radiation interactions; basic gas, scintillation, and semiconductor detectors; gamma spectrometry; health physics survey instrumentation; and thermoluminescent dosimetry. *Preq:* Consent of instructor.

E S E 430, 630 Air Pollution Engineering 3(3,0) Introductory course in air pollution and its control. Topics include air pollutants and effects, sources, dispersion models, engineering controls, and air-quality legislation. *Preq:* Senior standing in engineering or physical sciences.

E S E (AG E, FOR) 451, H451, 651 Newman Seminar and Lecture Series in Natural Resources Engineering 1(0,2) See AG E 451.

ESE (CE) 482, 682 Groundwater and Contaminant Transport 3(3,0) Basic principles of groundwater hydrology and transport of contaminants in groundwater systems; groundwater system characteristics; steady and transient flow; well hydraulics, design, and testing; contaminant sources, movement and transformations. *Prq:* E M 320. *Coreq:* ESE 401.

ESE (AG E, IE) 484, 684 Municipal Solid Waste Management 3(3,0) Introduction to the problems, regulations, collection, handling, recycling and disposal of municipal solid wastes in the urban and rural sectors. Emphasis will be on an integrated waste-management system with resource recovery, composting, incineration, landfill disposals and their costs. *Prq:* Senior standing in engineering or science or consent of instructor.

ESE 485, 685 Hazardous Waste Management 3(3,0) Introduction to the problems, regulations, treatment, and ultimate disposal of hazardous and toxic materials. Spill cleanup, groundwater transport, land disposal, incineration and treatment technologies are discussed. *Prq:* Senior standing in engineering or sciences.

ESE 491 Selected Topics in Environmental Engineering 1-3 A study of the dynamic role of environmental engineering in maintaining environmental quality. A comprehensive study of any phase of environmental engineering. *Prq:* Consent of department chair.

ENVIRONMENTAL TOXICOLOGY

Professors: R. J. Kendall, S. J. Klaine, *Chair*; T. E. Lacher, Jr., R. Noblet; *Associate Professors:* K. R. Dixon, T. W. La Point; *Assistant Professors:* G. P. Cobb, R. L. Dickerson, M. J. Hooper, S. McMurray, E. E. Smith; *Lecturer:* C. M. Bens

ENTOX 400, H400, 600 Wildlife Toxicology 3(3,0) Assessment of impacts of toxic substances on reproduction, health, and well-being of wildlife species; acute and chronic effects of agricultural chemicals, pesticides, hazardous waste, industrial waste, and oil releases will be discussed. *Prq:* BIOCH 210 or Organic Chemistry, one year of general biology, WFB 350 or consent of instructor.

ENTOX 421, H421, 621 Chemical Sources and Fate in Environmental Systems 3(3,0) Chemical cycles in the environment will be discussed on global and microcosm scales. The dependence of fate processes on physical and chemical properties and environmental conditions will be examined. Breakdown, movement, and transport of selected toxicants will be addressed to illustrate the mechanisms that govern chemical fate. *Prq:* Organic and analytical chemistry or consent of instructor.

ENTOX (ENT) 430, 630 Toxicology 3(3,0) See ENT 430.

EXPERIMENTAL STATISTICS

Professors: W. C. Bridges, Jr., P. M. Burrows, L. W. Grimes, H. S. Hill, Jr., *Chair*; J. E. Toler; *Assistant Professor:* J. R. Rieck; *Instructor:* R. M. Martinez-Dawson

EX ST 301, H301 Introductory Statistics 3(2,2) Basic concepts and methods of statistical inference;

organization and presentation of data, elementary probability, measures of central tendency and variation, tests of significance, sampling, simple linear regression and correlation. The role of statistics in interpreting research and the general application of the methods are stressed. Credit will be given toward graduation for only one of the following: EX ST 301, MTHSC 301, 302.

EX ST 411, 611 Statistical Methods for Process Development and Control 3(3,0) Experimental design techniques for use in process development, application of screening experiments and response surface experiments, techniques for process control with implications for product quality control. Includes discussions of the use of statistical computer analyses and interpretations including computer generated graphics. *Prq:* MTHSC 206 or consent of instructor.

EX ST 462, 662 Statistics Applied to Economics 3(3,0) Continuation of EX ST 301 with emphasis on statistical methods used in the collection, analysis, presentation and interpretation of economic data. Special attention is given to time series analysis, the construction of index numbers and the designing of samples for surveys in the social science fields. *Prq:* EX ST 301.

FINANCE

Associate Professors: S. W. Barnhart, J. M. Harris, Jr., R. H. Klein, R. B. McElreath, Jr., *Chair*; S. N. Rosenstein, M. F. Spivey, N. G. Waller; *Assistant Professors:* J. C. Alexander, Jr., Y. Kim, J. M. Miller; U. V. Sridharan; *Lecturer:* M. H. Dehner

FIN 210 Introduction to Investments 3(3,0) Examination of the basics of various investment alternatives. Course is aimed toward the non-business major. Credit may not be received for both FIN 210 and 306 or FIN 210 and 311.

FIN 304 Risk and Insurance 3(3,0) Studies the nature of risk and the role of insurance in risk management from individual and business viewpoints. Topics include probability, theory of the firm under uncertainty, insurance carriers and contracts, underwriting, and regulation. *Prq:* ECON 200, 211, or consent of instructor.

FIN 305 Investment Analysis 3(3,0) A study of techniques useful in analyzing alternative investment opportunities with emphasis on corporate securities. Investment planning and portfolio management are considered. *Prq:* FIN 306 or 311 or consent of instructor.

FIN 306 Corporation Finance 3(3,0) Introduction to financial management of nonfinancial firms. Includes such topics as analysis of financial statements, financial forecasting, capital budgeting, working capital management, and long-term financing decisions. Credit may not be received for both FIN 306 and 311. *Prq:* ACCT 200 or 202 or 203, or consent of instructor.

FIN 307 Principles of Real Estate 3(3,0) A course to acquaint the student with the theories, practices, and principles which govern real estate markets. Major emphasis will be placed on three areas: (1) specifics of real estate brokerage, property rights and ownership; (2) making real estate investment decisions; and (3) financing real estate investments. *Coreq:* FIN 306 or 311 or consent of instructor.

FIN 308 Financial Institutions and Markets 3(3,0) Study of the various types of financial institutions and of topics critical to the financial institutions practitioner. Topics include financial regulations, financial security types and their yields, interest rate risk management, foreign currency risks management and stock index futures. *Prq:* FIN 306 or 311 or consent of instructor.

FIN 311, H311 Financial Management I 3(3,0) First of a two-course sequence designed to provide in-depth exposure to the theory and practice of corporate financial management and to demonstrate how financial management techniques are applied in decision making. Credit cannot be received for both FIN 306 and 311. *Prq:* ACCT 202 and MTHSC 203 or 301.

FIN 312, H312 Financial Management II 3(3,0) Continuation of the two-course sequence that begins with FIN 311. *Prq:* FIN 311 or 306 with approval of a Finance Department advisor.

FIN 402, H402 Asset Management 3(3,0) A study of the decision process and analytical techniques used in evaluating corporate investment decisions, including both long-term capital investments and working capital management. Computer-based financial decision making will be used. *Prq:* FIN 312 or consent of instructor.

FIN 404, H404 Management of the Corporate Capital Structure 3(3,0) Financial policy, theory, and cases dealing with the use of debt financing, dividend policy, convertible securities, mergers and acquisitions, leasing, and special topics. *Prq:* FIN 312 or consent of instructor.

FIN 405, 605 Portfolio Management and Theory 3(3,0) Introduction to portfolio management. Includes the underlying theory, managing the equity and the fixed-income portfolios, portfolio evaluation, options-pricing theory, future markets and instruments. *Prq:* FIN 305 or either 306 or 311; or consent of instructor.

FIN 406, 606 Stock Options and Futures Markets 3(3,0) Consideration of the option pricing theory and strategy techniques most commonly used in the market for options. An overview of the futures markets is also considered. Special emphasis given to interest-rate futures, stock-index futures, and foreign-exchange futures. *Prq:* FIN 305 or consent of instructor.

FIN 408 Management of Financial Institutions 3(3,0) Detailed study of the operational, marketing, and regulatory aspects of the management of depository financial institutions. Emphasis will be placed on decision making through the extensive use of cases. *Prq:* FIN 308.

FIN 410, H410, 610 Research in Finance 1-3 Directed research course for students interested in a career in finance. Research topic selected by student and approved by instructor. A formal research paper is required. *Prq:* FIN 306 or 312 and consent of instructor.

FIN 411 International Financial Management 3(3,0) Extension of the principles of finance to the international context. Course focuses on the implications of the existence of multiple currencies and the operations across borders of sovereign nation-states for the multinational corporation. *Prq:* FIN 306 or 311 or consent of instructor.

FIN 415, 615 Real Estate Investment 3(3,0)

Course focuses upon the structure and analysis of real estate investment emphasizing financial theory and analysis technique. Case study and project-oriented homework assignments facilitate the understanding of real estate investments. *Preq:* FIN 307 and 306 or 311.

FIN 417, 617 Real Estate Finance 3(3,0) Advanced course applies financial analysis and theory to real estate. Mortgage credit analysis and current financing techniques for residential and commercial properties are emphasized. Topics include financial institutions, syndications and construction financing. *Preq:* FIN 307 and 306 or 311.

FOOD SCIENCE

Professors: J. C. Acton, *Chair*; S. F. Barefoot, R. D. Galyean, M. E. Kunkel, J. G. Surak, R. L. Thomas, T. C. Titus; *Associate Professor:* P. J. Vergano; *Assistant Professors:* F. H. Barron, P. L. Dawson; *Instructor:* E. C. Turner; *Visiting Professor:* W. P. Williams, Jr.; *Adjunct Professor:* C. R. Barmore; *Adjunct Instructor:* R. R. Perdue

FD SC 101 Epochs in Man's Struggle for Food 1(1,0) A study of significant developments in food preservation methods and the impact each has had on man's struggle for food.

FD SC 102 Perspectives in Food and Nutrition Sciences 2(2,0) Discussion course covering topics related to food science and human nutrition. Subjects will include topics of current interest and will involve familiarization with scientific literature in nutrition and food sciences.

FD SC 201 Man and His Food 2(2,0) Study of food and food products with emphasis on nutrients, nutrient needs, and the relationship between nutrient intake and health. Also discussed are food additives, nutritional awareness (to include nutrition labeling), food protection, and the influence of processing on nutritional quality of food.

FD SC 214 Food Resources and Preservation 4(4,0) Course will study food material resources and their preservation for quality and consumption as scientifically and technically practiced in the food industry. Food preservation by refrigerated and frozen storage, thermal processing and pasteurization, dehydration and concentration, fermentation, irradiation, microwave heating and food additives.

FD SC 306 Food Service Operations 3(3,0) Principles of management of resources in food service systems. Emphasis will be on menu planning, types of delivery systems, principles of quantity food production, techniques for cost control and concepts of food science and food safety. *Preq:* FD SC 214 or equivalent or consent of instructor.

FD SC 401, H401, 601 Food Chemistry I 4(3,3)F Even-numbered years. The basic composition, structure, and properties of food and the chemistry of changes occurring during processing utilization. *Preq:* BIOCH 210 or consent of instructor.

FD SC 402, H402, 602 Food Chemistry II 4(3,3)S Odd-numbered years. Application of theory and procedures for quantitative and qualitative analysis of food ingredients and food products. Methods for protein, moisture, lipid, carbohydrate, ash, fi-

ber, rancidity, color and vitamin analyses and tests for functional properties of ingredients are examined. *Preq:* BIOCH 210 or consent of instructor.

FD SC 404, 604 Food Preservation and Processing 3(3,0)S Even-numbered years. Principles of food preservation applied to flow processes, ingredient functions, and the importance of composition and physical characteristics of foods related to their processing. Product recalls and product development concepts. *Preq:* Physics and organic chemistry or biochemistry.

FD SC 406, 606 Food Preservation and Processing Laboratory I 1(0,3)S Even-numbered years. Laboratory exercises on preservation methods, equipment utilized, and processes followed in food manufacture. *Coreq:* FD SC 404/604.

FD SC 407, 607 Quality Food Production 2(1,3) Principles of the production of food in quantity for use in food service systems. Emphasis will be on functions of components of foods and of ingredients in food on the quality of the final product on safe production of food and on proper use of equipment. *Coreq:* FD SC 306 and 404.

FD SD 408, 608 Food Process Engineering 4(3,3) Study of basic engineering principles and their application in food processing operations. The relation between engineering principles and fundamentals of food processing is emphasized. *Preq:* FD SC 214, CH 102 or 112, MTHSC 106, PHYS 207 or 200 or 122 or consent of instructor.

FD SC (PKGSC) 409 Total Quality Management for the Food and Packaging Industries 3(3,0) Introduction to the principles of modern quality management with emphasis on quality standards and issues and the practices necessary for food processing and packaging companies to survive in a customer-driven marketplace.

FD SC 417 Seminar 1(1,0) Literature research and oral presentation of current food science topics.

FD SC 418 Seminar 1(1,0) Literature research and oral presentation of current food science topics.

FD SC 420, H420 Special Topics in Food Science 1-3(1-3,0) Special topics in food science not covered in other courses. *Preq:* Permission of instructor.

FD SC 421, H421 Special Problems in Food Science 1-4(0,3-12) Independent research investigation in food science areas not conducted in other courses. *Preq:* Permission of instructor.

FD SC 464, H464, 664 Food Packaging Systems 3(3,0) Characteristics and application of various materials and systems used in the packaging of foods. Engineering properties of the materials and methods used to measure properties are emphasized. Consideration is given to packaging systems for specific food applications. *Preq:* Consent of instructor.

FD SC 466, 666 Food Packaging Systems Laboratory 1(0,3) Laboratory and field exercises on food packaging operations and packaging materials. Methods to evaluate the physical and chemical properties of packaging materials will be emphasized. *Preq:* Consent of instructor.

FD SC 491 Practicum 1-4 Supervised experiential opportunities in the food industry. *Preq:* Junior standing and consent of department chair.

FOREST AND RECREATION RESOURCES

F&RR (HIST) 392 History of the Environment of the United States 3(3,0) See HIST 392

FOREST RESOURCES

Professors: G. R. Askew, Jr., D. C. Guynn, Jr., D. L. Ham, R. L. Hedden, D. N. Hon, D. D. Hook, G. D. Kessler, A. W. Lee, W. A. Leuschner, G. E. Sabin, W. A. Shain, T. J. Straka, F. H. Tainter, D. H. Van Lear, T. M. Williams, T. E. Wooten, *Interim Chair*; *Associate Professors:* W. H. Conner, C. A. Gresham, J. L. Haymond, A. P. Marsinko, L. R. Nelson, L. E. Nix; *Assistant Professors:* J. D. Lanham, A. E. Miller, P. N. Peralta, V. B. Shelburne; *Lecturer:* J. H. Syme

FOR 101 Introduction to Forestry 1(1,0)F An informative sketch of forestry, forests, and forestry tasks of the nation; education and career opportunities for foresters.

FOR 102 Introduction to Forestry 1(1,0)S Continuation of FOR 101.

FOR 205 Dendrology 3(2,3)F Classification, nomenclature, and identification of the principal forest trees of the United States, their geographical distribution, ecological requirements, and economic importance. Field identification of native trees and commonly planted exotics in the Piedmont and surrounding areas. *Preq:* BIOL 103 or consent of instructor.

FOR 206 Forestry Ecology 3(2,3)S Study of the nature of forests and forest trees, how they grow, reproduce, and their relationships to the physical and biological environment. *Preq:* AGRON 202, BIOL 103, FOR 205 or consent of instructor.

FOR (PRTM) 209 Professional Application of Microcomputers 3(1,4) [C.3] See PRTM 209.

FOR 221 Wood Properties I 3(2,3)F The formation of wood in forest trees, gross and minute characteristics of wood, defects in wood, variability in wood. *Preq:* BIOL 103 or consent of instructor.

FOR 222 Wood Properties II 3(2,3)S Wood in relation to moisture, heat, sound, light, and electricity; mechanical properties of wood; standard testing procedures for wood. *Preq:* FOR 221 or consent of instructor.

FOR 251 Forest Communities 2(0,6) Study of forest plant species and their successful status and habitat requirements with respect to landform, soil type, and other appropriate aspects of site classification. *Preq:* FOR 205 or consent of instructor.

FOR 252 Forest Engineering (Summer Camp) 3(0,9) Field and drafting practice in mapping, finding, and traversing boundary lines, road location, and forestry applications of surveying equipment and techniques. *Preq:* FOR 205 or consent of instructor.

FOR 253 Forest Resource Measurements I (Summer Camp) 3(0,9) Practical application of field techniques, including timber cruising, measuring tree heights and volumes, constructing volume tables, and boundary-line surveys. *Preq:* FOR 205 or consent of instructor.

FOR 254 Forest Products (Summer Camp) 1(0,3)
A tour of the forest products industry of South Carolina with an emphasis on those products and processes of some distinction or special interest. *Preq:* FOR 205 or consent of instructor.

FOR 255 Secondary Wood Products (Summer Camp) 1 A tour of the secondary wood products industries with an emphasis on industries too far from Clemson for the usual half-day field trips during regular sessions. *Preq:* FOR 205 or consent of instructor.

FOR 257 Forest Products Measurements (Summer Camp) 2 Measurements and classifications of a variety of wood products, from trees to finished products. *Preq:* FOR 221, 222 or consent of instructor.

FOR 258 Introduction to Forest Pests 1(0,3)
Introduction to forest insects and disease pests with emphasis on their identification and recognition of their damage. *Preq:* FOR 205 or consent of instructor.

FOR 300 Christmas Tree Production 2(2,0)F
Theory and practice of establishing, managing, and marketing trees with an emphasis on Christmas tree production in the South. *Preq:* Consent of instructor.

FOR 302, 602 Forest Resource Measurements II 3(2,3)S
Practical application of statistical and mensurational techniques in forest management. *Preq:* EX ST 301, FOR 253 or consent of instructor.

FOR 304, 604 Forest Resource Economics 3(3,0)F
Economic problems and principles involved in the utilization of forest resources and the distribution of forest products; analysis of integrated forest operations. *Preq:* ECON 200 or consent of instructor.

FOR 305 Elements of Forestry 3(2,2)F,S
A compendium of forestry subjects providing a broad view of the forest environment as it relates to ecology, management and utilization of forests, especially those of South Carolina. Field and laboratory exercises in the fundamentals of forest-land management. Not open to Forest Resource Management majors. *Preq:* BIOL 103 or consent of instructor.

FOR 306, 606 Wood and Wood Fiber Identification 2(1,3)F
Macroscopic and microscopic identification, properties, and uses of selected economically significant timbers. *Preq:* BIOL 103 or consent of instructor.

FOR 308, 608 Aerial Photographs in Forestry 2(1,3)F
Introduction to photographic measurements, aerial photointerpretations, mapping, and timber estimating. *Preq:* Forestry summer camp or consent of instructor.

FOR 309 Arboriculture, Tree Care, and Maintenance 3(3,0)
Principles, practices, and problems of protecting and maintaining trees in urban and recreational areas. Examines the environmental and biological factors that affect trees in high-use areas, their management and cultural requirements, and the practices necessary for their protection and care as valuable assets in the landscape. *Preq:* Junior standing or consent of instructor.

FOR 310, 610 Silviculture 4(3,3)S
Theory and practice of establishing, maintaining, and harvesting forest stands in accordance with ecological and economic principles. *Preq:* FOR 206, Forestry Summer Camp, or consent of instructor.

FOR 311 Forest Products Marketing Practices 3(3,0)
Study of marketing practices currently employed by the forest-products industry and the application of basic marketing principles and strategic concepts in the industry's present and future marketing environment. *Preq:* Junior standing or consent of instructor.

FOR 314 Harvesting and Forest Products 4(3,3)
Harvesting of forest products, structure and properties of economically important timbers, and production and properties of primary forest products. *Preq:* Forestry summer camp or consent of instructor.

FOR 315 Woodland Ecology 3(3,0)
Overview of the forest emphasizing the living and nonliving components of the woodland habitat. Understanding man's use of the forest and interpreting the signs of plants, wildlife, and landscapes.

FOR 321 Drying and Machining of Wood 3(2,3)F
Wood seasoning principles and practices, seasoning defects, machinery, and preparation of wood for processing. *Preq:* FOR 221, 222, or consent of instructor.

FOR 322 Wood Adhesives and Finishes 2(1,3)S
Theory of adhesion, chemical bonding, rheology, chemistry of adhesion, theory of finishes, exterior coatings and paints for wood. *Preq:* CH 101, 102, FOR 221.

FOR 323 Deterioration and Preservation of Wood 2(2,0)S
Deterioration agents, deterioration of wood in use, control of deterioration in manufacturing, preservation processes, types of preservation, fire retardants.

FOR 325 Chemical Aspects of Wood Utilization 3(2,1)F
Fundamental physical, organic, and polymer chemistry is applied to chemical processing of wood. Structures, reactions, and applications of cellulose, hemicelluloses and lignin are discussed. *Preq:* CH 102 or consent of instructor.

FOR 341 Wood Procurement Practices in the Forest Industry 3(3,0)
Study of wood raw material procurement practices currently employed by the forest products industry, including pulp, paper, and related areas. *Preq:* Consent of instructor.

FOR 400, 600 Public Relations in Natural Resources 3(3,0)
Identifying relevant policies, their characteristics and acceptance to natural resource management and techniques of maintaining appropriate public relations. *Preq:* Senior standing.

FOR 406 Forested Watershed Management 2(2,0)
Covers a basic discussion of processes and measurement of water flow on forested watersheds. Forest land management is stressed to assure adequate water quantity and quality. The role of water in nutrient cycling and forest growth will also be discussed. *Preq:* FOR 315 or 401 or consent of instructor.

FOR 407, 607 Forest Operations 3(2,1)F
Theory and practice of conducting forestry operations. Major emphasis on the methods, analysis of associated cost, and productive rates for timber harvesting and other mechanized field operations. *Preq:* Senior standing or consent of instructor.

FOR 409, 609 Multiple-Use Forestry 2(2,0)S
Study of the demand placed on forests for a variety of products and uses, and how these can and

must be reconciled in planning the management of each forest. *Preq:* Senior standing or consent of instructor.

FOR 411, 611 Harvesting Forest Products 3(2,3)S
Application of engineering and cost-analysis techniques to the evaluation of the forest transport system and various harvesting situations. *Preq:* FOR 407 or consent of instructor.

FOR 412, 612 Forest Protection 2(2,0)S
Prevention and suppression of forest fires; their effect upon the environment and people; factors affecting fire behavior; and use of fire in resource management. *Preq:* Senior standing or consent of instructor.

FOR 413, 613 Integrated Forest Pest Management 3(3,0)F
Nature and control of pests of forest trees and products. Will focus on the relation of pests to silviculture, management, and natural forest ecosystems. *Preq:* Junior standing in Forest Resource Management.

FOR 414, 614 Forest Management Plans 2(2,0)S
Analysis of factors entering into forest working plans of several forestry organizations; preparation of a preliminary management plan of a sample area. *Preq:* FOR 417.

FOR 415, 615 Forest Wildlife Management 3(2,3)F
Principles, practices, and problems of wildlife management with emphasis on upland forest game species. Habitat manipulation through use of appropriate silvicultural practices in association with other techniques is evaluated. *Preq:* FOR 310 or consent of instructor.

FOR 416, 616 Forest Policy and Administration 2(2,0)S
Introduction to the development, principles, and legal provisions of forest policy in the United States, and an examination of administrative and executive management in forestry.

FOR 417, 617 Forest Resource Management and Regulation 3(3,0)
Fundamental principles and analytical techniques in the planning, management, and optimization of forest operations. *Preq:* FOR 302, 304, 308, 310, and Forestry summer camp.

FOR 418 Forest Resource Valuation 2(2,0)
Analysis of capital investment tools and their application to decision making among forestry investment alternatives; valuation of land, timber, and other resources associated with forestry, including the impact of inflation and taxes. *Preq:* FOR 304 or consent of instructor.

FOR 419 Senior Problems 1-3(1-3,0)
Problems chosen with faculty approval in selected areas of forestry. *Preq:* Senior standing.

FOR 420, 620 Forest Products 3(2,3)S
Primary forest products including lumber, poles and piles, veneers and plywoods, secondary wood products; chemically derived products from wood including pulp and paper, distillation products, wood hydrolysis; miscellaneous and minor forest products. *Preq:* FOR 306, Forestry Summer Camp, or consent of instructor.

FOR 421, 621 Biology and Silviculture of Hardwood Forests 2(1,2)F
Study of the silvics, growth, and development of major hardwood species of North America that will relate these biological characteristics to the ecology, silviculture, and utilization of the hardwood forests of the Eastern United States. *Preq:* FOR 205, 206, 306, 310, or consent of instructor.

FOR 422, 622 Forest Products International Trade 3(3,0) Study of major supply regions, major trade flows, international demand, trade patterns, and industry structure and practices involved in international trade of forest products. *Preq:* Senior standing or consent of instructor.

FOR 423, 623 Current Issues in Natural Resources 2(2,0) Lectures in various fields of forestry delivered by selected representatives from forest industries, consultants, agencies, associations, and other forestry operations. Course will not be taught when enrollment is less than 15. To be taken Pass/Fail only. *Preq:* Junior standing or consent of instructor.

FOR 425 Forest Resource Management Plans 3(2,3) Development of multiple resource forest management plans. Economic and environmental impacts of implementing management plans. *Preq:* FOR 417 or consent of instructor.

FOR 426, H426 Forest Resource Management Plans Seminar 1(1,0) An in-depth exploration of topics and problems presented in FOR 425. To earn honors credit, a student must be enrolled in corequisite FOR 425 and earn a B or better in both courses. *Preq:* Senior standing and approval of Department of Forest Resources. *Coreq:* FOR 425.

FOR 429, 629 Wood Design 3(2,3) The technical mechanical properties of wood; load analysis and design criteria; design of structural elements in wood. *Preq:* FOR 328 or consent of instructor.

FOR 430, 630 Composite Wood Materials 3(2,3) Manufacturing methods, physical and mechanical properties, and uses of wood-polymer composites, wood laminates, plywood, particleboard, fiberboard, reconstituted board products, structural sandwich panels, paper-base plastic laminates, and extruded and molded products. *Preq:* FOR 222 or consent of instructor.

FOR 431, 631 Recreation Resource Planning in Forest Management 2(1,3) Odd-numbered years. Analysis of forest recreation as a component of multiple-use forest management; techniques of planning; physical and biological effects on forest environments; and forest site, user, and facility management.

FOR 432, 632 Forest Site Capability 2(2,0) Analysis of use pressures on the forest land base and their effects on the capability of the forest to satisfy resource demands. Productivity and sensitivity of sites will be discussed. *Preq:* Senior standing in Forestry or consent of instructor.

FOR 434, 634 Foreign Woods and Their Properties 2(1,3) Identification of commercially important foreign woods imported into the United States, their macroscopic and microscopic features, basic wood properties, and use. *Preq:* FOR 221, 306, consent of instructor.

FOR 435, 635 Park and Forest Structures 2(2,0) Selection, processing, protection, and maintenance of wood used in park and forest structures. *Preq:* Senior standing or consent of instructor.

FOR 441, 641 Properties of Wood Products 3(3,0) Basic properties of wood, including the hygroscopic, thermal, electrical, mechanical, and chemical properties; standard testing procedures for wood. *Preq:* Junior standing or consent of instructor.

FOR 442, 642 Manufacture of Wood Products I 3(3,0) Manufacture of lumber, plywood, millwork, poles, piles, and railroad ties; drying and preservation of wood products; product classifications, grades, and uses. *Preq:* FOR 221 or consent of instructor.

FOR 443, 643 Manufacture of Wood Products II 3(3,0) Manufacture of particleboard, flakeboard, oriented-strand board, fiberboard, and paper products. Includes their physical, mechanical, and chemical properties, and their applications. *Preq:* FOR 221 or consent of instructor.

FOR 444, 644 Forest Products Marketing and International Trade 3(3,0) Study of marketing and international trade practices currently employed by the forest products industry and the application of basic marketing principles and global trade concepts in the industry's current and future environment. *Preq:* FOR 442 or 443 or consent of instructor.

FOR 445, 645 Forest Products and the Environment 3(3,0) Introduction to the use of wood as a basic material and its impact on the environment. Discusses environmental issues affecting wood processing, pulp and paper, and preservation industries. Includes the reuse and recycle of wood and paper wastes and the development of composites from these wastes. *Preq:* FOR 442 or consent of instructor.

FOR 446, 646 Wood Products Applications and Specifications 3(3,0) Application of lumber, plywood, particleboard, waferboard, oriented-strand board, and treated-wood products in building construction. Includes the proper application of load tables, allowable span, and spacing. *Preq:* FOR 442 or 443 or consent of instructor.

FOR 447, 647 Special Problems in Forest Products 1-3(0,3-9) Laboratory, library, or field study of problems in selected areas of forest products. Emphasis will be placed on the planning and execution of research, and the reporting of results. The research work must be conducted under the guidance of a Forest Products faculty. May be repeated for a maximum of three credits, but only if different topics are covered. *Preq:* Senior standing and consent of instructor supervising the study.

FOR (AG E, E S E) 451, H451, 651 Newman Seminar and Lecture Series in Natural Resources Engineering 1(0,2) See AG E 451.

FOR 460, 660 Silviculture I 3(2,3) Discussion of the theory and practice of establishing, maintaining, and harvesting forest stands in accordance with ecological and economic principles. *Preq:* FOR 206 and Forestry Summer Camp or consent of instructor.

FOR H461 Silviculture Honors Seminar I 1(1,0) An in-depth exploration of topics and problems presented in FOR 460. To earn honors credits, a student must be enrolled in corequisite FOR 460 and earn a B or higher in both courses. *Preq:* Junior standing and approval of Department of Forest Resources. *Coreq:* FOR 460.

FOR 462, 662 Silviculture II 3(2,3) Discussion of forest management practices that affect ability of the land to produce multiple forest resources, with emphasis on water, nutrients, and fire. *Preq:* FOR 401 or consent of instructor.

FOR H463 Silviculture Honors Seminar II 1(1,0) An in-depth exploration of topics and problems presented in FOR 462. To earn honors credits, a student must be enrolled in corequisite FOR 462 and earn a B or higher in both courses. *Preq:* Junior standing and approval of Department of Forest Resources. *Coreq:* FOR 462.

FOR H491 Senior Honors Thesis I 3(3,0) Individual forestry research for students in the Forestry Honors program that focuses on developing a plan of research under the direction of a faculty advisory committee. *Preq:* Senior standing, participation in Honors Program, and approval of Department of Forest Resources.

FOR H492 Senior Honors Thesis II 3(3,0) Individual forestry research for students in the Forestry Honors program that focuses on data collection, analysis, report writing, and oral presentation. *Preq:* FOR H491.

FRENCH

Professors: M. Cranston, H. E. Stewart; *Associate Professors:* J. C. Bednar, D. J. Calvez, K. M. Szurlo; *Assistant Professors:* D. Lepetit, J. B. Macy; *Instructors:* E. G. Combiere, R. Willingham

FR 101 Elementary French 4(3,1) Multimedia course for beginners that combines video, audio and print to teach the fundamentals of the French language and culture. Designed to place emphasis on communicative proficiency (listening comprehension and speaking; reading and writing).

FR 102 Elementary French 4(3,1) Continuation of FR 101; three hours a week of classroom instruction and one hour a week in the language laboratory.

FR 151 French for Graduate Students 3(3,0) Intensive program only for graduate students preparing for the reading examination in French. A minimum grade of B on a final examination will satisfy graduate school foreign language requirement. May be repeated once for credit. To be taken Pass/Fail only. *Preq:* Graduate standing.

FR 196 Practicum in French 1(0,1) On-campus program of teaching foreign languages to children. Students work under the supervision of faculty in planning and teaching one 45-minute class per week to children in grades 1-8. May be repeated for a total of three credits. *Preq:* Third-year language standing or consent of department chair.

FR 201, H201 Intermediate French 3(3,0) A brief review of FR 101 and 102, with conversation, composition, and dictation, and the beginning of more serious reading of French prose. This course includes literary and cultural perspectives. *Preq:* FR 102.

FR 202, H202 Intermediate French 3(3,0) Emphasis on reading nontechnical French prose more rapidly. Writing, speaking, and listening skills will continue to be developed. This course includes literary and cultural perspectives. *Preq:* FR 201.

FR 299 Foreign Language Drama Laboratory 1(0,3) Participation in foreign drama productions. No formal class meetings, but an average of three hours per week in a foreign language drama workshop for production. May be repeated for a total of three credit hours. *Preq:* Consent of instructor directing the play.

FR 300 Survey of French Literature 3(3,0) Study of selected masterpieces of French literature in their artistic, cultural, and historical context. May include theme and genre studies. *Preq:* FR 202 or consent of department chair.

FR 305 Intermediate French Conversation and Composition I 3(3,0) Practice in the spoken language, with stress on vocabulary building, pronunciation, intonation, and comprehension; written work to increase accuracy. Assignments in the language laboratory. *Preq:* FR 202 or consent of department chair.

FR 307 French Civilization 3(3,0) Study of significant aspects of the culture of France from its origins to 1945. *Preq:* FR 202 or consent of department chair.

FR 308 Contemporary French Culture and Civilization 3(3,0) Study of significant aspects of the culture of France from 1945 to the present. *Preq:* FR 202 or consent of department chair.

FR 309 French Linguistics 3(3,0) Study of the fundamental structures of the French language: phonetics, syntax, and semantics. *Preq:* FR 202 or consent of department chair.

FR 316 French for International Trade I 3(3,0) Spoken and written French common to the French-speaking world of business and industry, with emphasis upon business practices and writing and translating business letters and professional reports. Cross-cultural references provide opportunity for comparative and contrastive analyses of American and French cultural patterns in a business setting. *Preq:* FR 202 and 305 (either prerequisite or concurrently); or consent of department chair.

FR 398 Directed Reading 1-3(1-3,0) Directed study of selected topics in French literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

FR 400 Modern French Literature 3(3,0) Study of selected works of twentieth-century French literature in their artistic, cultural, and historical context. *Preq:* FR 202 or consent of department chair.

FR 406 Nineteenth-Century French Literary Movements 3(3,0) Study of genres representative of the literary theories which contributed to the great diversity of the literature, painting, and music of the period. *Preq:* FR 300.

FR 407 Eighteenth-Century French Literature 3(3,0) The principal literary figures of the 18th century, with particular emphasis on Voltaire and Rousseau. *Preq:* FR 300.

FR 408 Seventeenth-Century French Literature 3(3,0) Major literary figures, themes, and forms of 17th-century French literature. *Preq:* FR 300.

FR 409 Advanced Grammar and Composition 3(3,0) Intensive study of syntax and stylistics through composition and translations. *Preq:* Senior standing or consent of department chair.

FR 411 Advanced French Conversation and Composition 3(3,0) Continuation of FR 305, with emphasis on greater fluency and sophistication in oral and written expression. *Preq:* FR 305 or consent of instructor.

FR 416 French for International Trade II 3(3,0) Study of language and cultural environment of the French-speaking markets of the world, including the linguistic and cultural idioms which support

global marketing in general and the international marketing of textiles, agricultural products, and tourism in particular. *Preq:* FR 316.

FR 417 The French Corporation 3(3,0) Examination of the organization, structure, functioning and economic role of the French business enterprise. *Preq:* FR 316 or consent of department chair.

FR 498 Independent Study 1-3(1-3,0) Directed study of selected topics in French literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

FR 499, 699 Selected Topics in French Literature 3(3,0) Selected topics that have characterized French literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

GENETICS

Professors: S. R. Chapman, W. D. Graham, Jr., R. H. Hilderman, J. S. Rice, E. R. Shipe, H. T. Skorupka; *Associate Professors:* A. G. Abbott, W. V. Baird, W. C. Bridges, Jr., R. A. Dean, N. H. Ferguson, D. G. Heckel, W. M. Surver, D. G. Yardley; *Assistant Professor:* W. R. Marcotte, Jr.

GEN 201 Genetics and Human Affairs 3(3,0) SS Basic genetic principles emphasizing human heredity and the relationship of genetics to society. Discussion of chromosome abnormalities, inborn errors of metabolism, sex-related traits, genetic counseling, and other current genetic topics. Course is designed as an elective for students in nonbiological science majors. Will not substitute for GEN 302.

GEN 302, H302 Introductory Genetics 4(3,3) Basic course introducing fundamental principles of inheritance in prokaryotes and eukaryotes. Emphasis is given to Mendelian genetics, physical and chemical basis of heredity, population genetics, and microbial genetics. *Preq:* BIOL 104 and one semester of biochemistry, or BIOL 110, or consent of instructor.

GEN (BIOSC) 416, 616 Recombinant DNA 3(3,0) Designed to familiarize the student with the most current facts and concepts of molecular genetics. The lectures will focus on gene organization, structure, and expression in prokaryotes and eukaryotes, highlighting current technologies and research in these areas. *Preq:* GEN 302 or its equivalent and one semester of biochemistry or consent of instructor. A developmental biology course is also strongly recommended.

GEN (BIOSC, MICRO) 418, 618 Biotechnology I: Nucleic Acids Techniques 4(2,4) See BIOSC 418.

GEN 451, 651 Advanced Genetics 3(3,0) F Even-numbered years. Advanced study of the principles of general genetics. Topics emphasized are variations in chromosome number and structure, natural and induced mutations, extranuclear inheritance, recombination, control of gene activity, genes and development, genetics of behavior patterns, population genetics, systems of mating, genetics and man. *Preq:* GEN 302 or equivalent.

GEOGRAPHY

Associate Professor: J. A. Miller; *Assistant Professor:* T. G. Young; *Visiting Assistant Professor:* L. F. Howard

GEOG 101 Introduction to Geography 3(3,0) Survey of the nature of geography, with emphasis on the discipline's organizing themes of earth science, relations between people and their environments, interrelations between places, locational analysis, and area studies.

GEOG 103 World Regional Geography 3(3,0) Systematic and descriptive survey of the major regions of the world, including their physical and cultural features. Provides a global context for courses in the social sciences and humanities.

GEOG 220 Historical Geography 3(3,0) Exploration of geographical change and the varied patterns of past human activities and people's relationships with the physical environment. Case studies from around the world are used to emphasize key themes in historical geography. Not open to students who have taken GEOG 102.

GEOG 301 Political Geography 3(3,0) Geographic basis of states: sovereignty, territory, power within states, relations between states. The geography of international affairs. *Preq:* GEOG 101 or 103 or permission of instructor.

GEOG 302 Economic Geography 3(3,0) Spatial analysis of economic activity, with an emphasis on regional economics and development. Topics include world population; technology and economic development; principles of spatial interaction; and geography of agriculture, energy manufacturing, and tertiary activities.

GEOG 303 Urban Geography 3(3,0) Historical and contemporary survey of the urban world, with particular attention paid to the relationship between people and urban places. Topics include the rise of cities, urban hierarchies, urban land use, and the social geography of cities.

GEOG 305 Cultural Geography 3(3,0) Broad examination of the basic cultural variables in the human occupation of the earth. Ecological, spatial, regional, and historical approaches; topics vary but may include cultural areas and distributions, cultural change, cultural landscape, and cultural ecology.

GEOG 330 Geography of the Middle East and North Africa 3(3,0) Thematic survey of a world region extending from Morocco to Afghanistan. Emphasis on climate, environment, social geography, historical development of the regional culture of Islam, and common problems facing the area today.

GEOG 340 Geography of Latin America 3(3,0) Introduction to the physical, economic, political, and human/cultural geography of Latin America. Special focus on regional unity and diversity and on the historical interaction of man and environment.

GEOG 350 Geography of South Carolina 3(3,0) Geographical perspective of the economic, social, and political development of South Carolina landscapes.

GEOG 401, 601 Studies in Geography 3(3,0) Intensive study of the geography of a selected world region, such as North America, Europe, or the Middle East, or the geography of a topic such as the geography of oil or the geography of underdevelopment. With departmental permission, may be repeated once for credit. *Prq:* GEOG 101, 103 or 220 or consent of instructor.

GEOG 410, 610 Geography of the American South 3(3,0) Study of the geography of the American South in its changing complexities across almost 400 years of development. *Prq:* GEOG 101, 102, or 220 or consent of instructor.

GEOG 420, 620 Historical Geography of the United States 3(3,0) Survey that places the spatial concepts of geography into a time sequence with special emphasis upon the United States. *Prq:* GEOG 101, 102, or 220 or consent of instructor.

GEOG (PRTM) 430, 630 World Geography of Parks and Equivalent Reserves 3(3,0) See PRTM 430.

GEOG 499 Independent Study in Geography 3(3,0) Study of selected topics in geography under the direction of a faculty member chosen by the student. The student and faculty member develop a course of study designed for the individual student and approved by the head of the department prior to registration.

GEOLOGY

Professors: F. J. Molz, R. D. Warner, *Chair; Associate Professors:* R. W. Falta, J. R. Wagner, *Assistant Professor:* J. W. Castle; *Visiting Professors:* S. M. Benson, D. S. Snipes; *Visiting Assistant Professor:* V. Price; *Visiting Instructors:* A. F. Weekes, R. D. White; *Research Associate:* R. A. Hodges

GEOG 100 Current Topics in Geology 1(1,0) Lectures and demonstrations covering topics of current interest in the different fields of geology. Recent research developments and career opportunities in the geosciences are emphasized.

GEOG 101, H101 Physical Geology 3(3,0) Study of the minerals and rocks which compose the earth's crust, their origins and transformations. Emphasis is placed upon geological processes, both internal and external, by which changes are produced on or in the earth.

GEOG 102 Historical Geology 4(3,2) Survey of the earth's geologic history emphasizing how the continents and ocean basins have evolved through geologic time. Evolution of life from the beginning of the fossil record through the present. Identification of fossil plants and animals and interpretation of earth's past through study of geologic maps. Field trips illustrate principles. *Prq:* GEOG 101, 103.

GEOG 103, H103 Physical Geology Laboratory 1(0,2) Laboratory to accompany GEOG 101. Instruction is provided in the identification of minerals and rocks and in the interpretation of geologic processes through study of topographic maps. Field trips provide direct observation of processes and results. *Coreq:* GEOG 101.

GEOG 112 Earth Resources 3(3,0) Survey of earth's mineral, energy, water, and land resources, and environmental and societal impacts associated with the use of these resources. *Prq:* GEOG 101.

GEOG 114 Earth Resources Laboratory 1(0,2) Laboratory to accompany GEOG 112. Instruction is provided in the identification of ore and gem minerals and of other earth materials of economic importance. Land and water resources are explored through the use of topographic maps, aerial photographs, remotely sensed images, and field trips. *Prq:* GEOG 103. *Coreq:* GEOG 112.

GEOG 210 Geology of the National Parks 3(3,0) Survey of selected national parks and monuments emphasizing the dynamic geological processes which have shaped the landscapes of these areas. Special attention will be focused on parks exhibiting recent geological activity related to volcanoes, earthquakes and glaciers. Slides and films will be used to highlight specific geological features.

GEOG (ASTR) 220 Planetary Science 3(3,0) Survey of the formation and evolution of planetary bodies. Emphasis is placed upon the origin of planetary material and comparative study of the primary processes operative on planetary surfaces. The major features of the planets and moons in our solar system, as revealed by recent space missions, are described.

GEOG 302, H302 Structural Geology 4(3,2) The diverse geological structures of the earth, their description, origin, and field recognition. Practical problems in interpreting geologic structures are utilized, in addition to theoretical considerations of the mechanics and causes of tectonism. *Prq:* GEOG 101.

GEOG 306 Mineralogy 4(3,3) Introduction to fundamental concepts of crystallography and crystal chemistry. Topics include crystal symmetry, principles of crystal structures, introductory x-ray crystallography, composition and stability of minerals, and systematic mineralogy. Laboratory exercises emphasize the recognition of crystallographic features and identification of minerals based on their physical properties.

GEOG 310 Optical Mineralogy 3(1,5) Involves techniques of mineral identification with polarizing microscope. Criteria are provided for the determination of optical properties using oil immersion grain mounts. The student is also introduced to the study of minerals and rocks in thin section. Lecture topics explore mineral optics theory. *Prq:* GEOG 306.

GEOG 314 Sedimentary Petrology 3(2,3) Origin, composition, and texture of sediments and sedimentary rocks, including both siliciclastic and chemical varieties. Interpretation of tectonic settings, depositional systems, facies relationships, and diagenesis. Laboratory involves description and classification of hand specimens and thin sections and analytical methods. *Prq:* GEOG 102, 310, or consent of instructor.

GEOG 316, H316 Igneous and Metamorphic Petrology 3(2,3) Classification, occurrence, and origin of igneous and metamorphic rocks. Discussion of the chemical and physical processes involved in magmatic crystallization and metamorphism. Laboratory study of igneous and metamorphic rocks in hand specimen and thin section. Not open to students who have received credit for GEOG 309. *Prq:* GEOG 306, 310 or consent of instructor.

GEOG 320, H320 Engineering Geology 3(3,0) Application of engineering principles to geologic problems. Identification of important material properties and mechanics of earth materials. Techniques of geologic site evaluation with emphasis on civil works and construction projects. *Prq:* GEOG 101, 103, MTHSC 108, PHYS 122.

GEOG 400, H400, 600 Environmental Geology 3(3,0) Discussion-oriented introductory study of the relationships of man to his physical surroundings and the problems resulting from upsetting the established equilibria of geologic systems; man's role as a geologic agent, environmental conservation and management.

GEOG 401, 601 Applied Geophysics 3(2,2) Introduction to the most important methods of geophysical exploration and their application to the investigation of subsurface groundwater and mineral resources. Emphasis is on the principles, techniques, interpretations and limitations of magnetic, gravimetric, electrical, electromagnetic, well-logging and seismic geophysical surveys. *Prq:* GEOG 101 or consent of instructor; PHYS 208 or 221 recommended.

GEOG 403, 603 Invertebrate Paleontology 3(2,3) Study of life of past geologic ages, as shown by fossilized remains of ancient animals, with emphasis on the invertebrates. *Prq:* GEOG 101 or consent of instructor.

GEOG 404, 604 Economic Geology 3(3,0) This course concerns the description and classification of ore deposits and commercial nonmetallic mineral deposits. The origin of mineral deposits and their occurrence is emphasized. Problem studies and field trips to nearby mines and quarries. *Prq:* GEOG 306.

GEOG 405, 605 Geomorphology 3(2,2) Study of the surface features of the earth—their form, nature, origin, development, and rates and patterns of changes they are undergoing. Laboratory studies emphasize a process approach to terrain analysis stressing complex interactions of geologic, climatic, and tectonic forces. *Prq:* GEOG 101, 102, or consent of instructor.

GEOG 407, 607 Quaternary Geology 3(2,2) Early concepts about glaciation. Types and distribution of glaciers today and during their maximum extent. Glacial erosion, transportation and ice-sculptured terrain features. Study of quaternary sediments and their chronology. Drainage changes, sea-level fluctuations and crustal deformation. Detailed study of specific areas as time permits. Field trips.

GEOG 408, 608 Geohydrology 3(3,0) Study of the hydrologic cycle, aquifer characteristics, theory of groundwater movement, mechanics of well flow, experimental methods, and subsurface mapping. *Prq:* GEOG 101, 102.

GEOG 411, H411 Research Problems 1-3(0,3-9) Field, laboratory, or library study of an approved topic in geology. Topic would be one not normally covered in formal courses, but may be an extension of a course. Taught either semester and may be taken more than once for a maximum of six credits. *Prq:* Senior standing or consent of instructor.

GEOL 412, 612 Geochemical Analytical Techniques 3(1,4) Introduction to techniques of chemical analysis applied to earth materials. Emphasis is placed on the use of atomic absorption spectroscopy to analyze groundwater, soil and bulk rock samples, and electron probe microanalysis to determine mineral compositions. *Preq:* CH 101 and 102, GEOL 306 or consent of instructor.

GEOL 413, 613 Stratigraphy 3(2,2) Analysis of stratified rocks as the repository of earth history and the conceptual framework used to synthesize the world geologic record as a coherent whole. Emphasis is placed not only on traditional lithostratigraphy but also on modern seismic stratigraphy, biostratigraphy, magnetostratigraphy, and current stratigraphic issues. *Preq:* GEOL 314 or consent of instructor.

GEOL 451, 651 Selected Topics in Hydrogeology 1-4(1-3,0-3) Selected topics in hydrogeology, with emphasis on new developments in the field. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* GEOL 400 or 408, or consent of instructor.

GERMAN

Professors: H. M. Riley, M. M. Sinka; *Associate Professors:* E. P. Arnold, J. M. Melton

GER 101 Elementary German 4(3,1) A course for beginners in which, through conversation, composition and dictation, the fundamentals of the language are taught and a foundation is provided for further study and the eventual ability to read and speak the language. Three hours a week of classroom instruction and one hour a week in the language laboratory.

GER 102 Elementary German 4(3,1) Continuation of GER 101; three hours a week of classroom instruction and one hour a week in the language laboratory.

GER 151 German for Graduate Students 3(3,0) Intensive program only for graduate students preparing for the reading examination in German. A minimum grade of B on a final examination will satisfy graduate school foreign language requirement. May be repeated once for credit. To be taken Pass/Fail only. *Preq:* Graduate standing.

GER 190 Study and Travel Abroad Preparation 1(1,0) Designed to prepare students for study/travel in German-speaking countries. Students will be sensitized to cross-cultural differences and will be provided with practical skills and sources of information. Taught mainly in English. To be taken Pass/Fail only.

GER 201, H201 Intermediate German 3(3,0) Brief review of GER 101 and 102, with conversation, composition and dictation, and the reading of more serious German prose in short stories and plays. This course includes literary and cultural perspectives. *Preq:* GER 102.

GER 202, H202 Intermediate German 3(3,0) Emphasis on reading nontechnical German prose more rapidly. Writing, speaking, and listening skills will continue to be developed. This course includes literary and cultural perspectives. *Preq:* GER 101 or consent of instructor.

GER 299 Foreign Language Drama Laboratory 1(0,3) Participation in foreign language drama productions. No formal class meetings, but an average of three hours per week in a foreign language drama workshop for production. May be repeated for a total of three credits. *Preq:* Consent of instructor directing the play.

GER 301 Twentieth-Century German Drama 3(3,0) Selected works from major German-speaking dramatists of the 20th century, including Brecht, Dürrenmatt, and Frisch. Required of German majors. *Preq:* GER 202 or consent of department chair.

GER 302 Twentieth-Century German Prose and Poetry 3(3,0) Selected prose and poetry from major 20th century German-speaking authors, including Rilke, Mann, Hesse, Kafka, and Böll. Required of German majors. *Preq:* GER 202 or consent of department chair.

GER 305 Intermediate German Conversation and Composition 3(3,0) Practice in the spoken language, with emphasis on vocabulary, pronunciation, and comprehension; written exercises for accuracy. Required of German majors. *Preq:* GER 202 or consent of department chair.

GER 308 German Civilization 3(3,0) Study of significant aspects of the culture of the German-speaking peoples from their origins to 1945. *Preq:* GER 202 or consent of department chair.

GER 309 Modern German Culture 3(3,0) Study of modern German culture from 1945 to the present with particular emphasis on the Federal Republic of Germany and significant aspects pertaining to the German Democratic Republic. *Preq:* GER 202 or consent of department chair.

GER 316 German for International Trade I 3(3,0) Spoken and written German common to the German-speaking world of business and industry, with emphasis upon business practices and writing and translating business letters and professional reports. Cross-cultural references provide opportunity for comparative and contrastive analysis of American and German cultural patterns in a business setting. *Preq:* GER 251 or 202 and 305 (prerequisite or concurrently); or consent of department chair.

GER 398 Directed Reading 1-3(1-3,0) Directed study of selected topics in German literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

GER 400 Goethe and His Age 3(3,0) Study of the most significant period of German literature, with readings from works by Goethe, Schiller, and the Romantics. Supplementary materials may include audio visuals and documents on the music, art, and science of the period. Recommended for German majors. *Preq:* GER 301, 302, or consent of department chair.

GER 401 Studies in German Literature I 3(3,0) Selected topics in German literature from the beginning to 1832. *Preq:* GER 301, 302, or consent of department chair.

GER 402 Studies in German Literature II 3(3,0) Study of selected topics in 19th or 20th century German literature. *Preq:* GER 301, 302, or consent of department chair.

GER 403 Studies in German Literature III 3(3,0) Study of a major theme in German literature within a chosen time period or in the work of one major author. The themes may be subject- or genre-oriented. *Preq:* GER 301, 302, or consent of department chair.

GER 411 Studies in the German Language I 3(3,0) Advanced training in the spoken and written language with emphasis on vocabulary, syntax, and stylistics. *Preq:* GER 305 or consent of department chair.

GER 412 Studies in the German Language II 3(3,0) In-depth study of terminology and syntax for specific subject areas in business, in the liberal arts, and in the sciences. *Preq:* GER 301, 302, 305, or consent of department chair.

GER 413 Studies in German Culture 3(3,0) Intensive study of selected topics concerning cultural phenomena of the German-speaking nations. *Preq:* GER 301, 302, 305, or consent of department chair.

GER 416 German for International Trade II 3(3,0) Study of language and cultural environment of the German-speaking markets of the world, including the linguistic and cultural idioms which support global marketing in general and the international marketing of textiles, agricultural products, and tourism in particular. *Preq:* GER 316.

GER 417 German for International Trade III 3(3,0) An examination of the cultural and economic aspects of reconstructing eastern Germany's economy since the 1990 German unification. *Preq:* One German course on the 300 level or consent of department chair.

GER 498, 698 Independent Study 1-3(1-3,0) Supervised study of selected topics in German literature, language, or culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

GRAPHIC COMMUNICATIONS

Professors: J. P. Crouch, E. L. Weir, W. E. West, *Chair;* *Associate Professors:* S. T. Ingram, J. M. Leininger; *Instructors:* N. W. Leininger, P. G. Rose; *Lecturers:* S. H. Edleir, C. O. Huey III, C. D. Jones, F. C. Porcher, Jr.

G C 101 Orientation to Graphic Communications 1(1,0) Introduction to the curriculum and the industry including its processes, products, and careers. Emphasis is placed on the attributes which are most desirable for successful entry and advancement up a variety of career ladders.

G C 104, H104 Graphic Communications I 4(2,6) Emphasis on basic graphic arts industrial concepts, principles and practices, with laboratory applications in photography, layout and design, conventional and electronic copy preparation, reproduction photography, offset lithography, screen printing and finishing operations. Flexography, gravure, letterpress and specialty printing processes are also covered, along with environmental, health, and safety concerns.

G C 207, H207 Graphic Communications II 3(1,6) Continuation of G C 104. An intermediate course for the graphic communications and graphic arts specialists which broadens skills and technical knowledge in areas of layout, copy preparation, reproduction photography, film assembly, screen

printing lithographic presswork, and finishing. *Preq:* GC 101, 104, typewriter/computer keyboarding skills of 20 net words per minute.

G C 215, H215 Photographic and Digital Imaging Techniques 3(1,6) Emphasizes application of black and white and color imaging by photographic and digital technologies. Laboratory experiences assure confidence in the use of photographic and digital techniques for creating and enhancing original images for graphic reproduction and distribution.

G C 310, H310 Alternative Approaches to Imaging 3(1,6) Intended to promote the refining of skills learned in G C 104 and 207, with an in-depth study and application of computerized prepress systems and methodologies. It also serves as a transition course to the advanced graphic classes teaching offset lithography, flexography, screen printing, and gravure. *Preq:* G C 207 or consent of instructor.

G C 350 Graphic Communications Internship I 1(0,3) Full-time supervised employment in an industrial in-plant setting for expansion of experience with materials and processes, production people, and organizations. *Preq:* G C 104 or 207 or equivalent and consent of instructor.

G C 406, H406, 606 Problems in Specialty Printing 4(2,6) Study of the problems and converting in package, label, and specialty industries. Laboratory applications include flexographic preparation, printing and die cutting; die making and die cutting screen and offset printed sheet stock; sublimation and plastisol transfer printing; plastic and metal container printing. *Preq:* G C 207 and THRD 224.

G C 407, 607 Advanced Flexographic Methods 4(2,6) An in-depth study of the methods used in flexographic printing and converting of porous and nonporous substrates. Theory and laboratory applications include setting standards for process color, preparation of plate systems, ink mixing and color matching, testing of films and foils, analysis of recent developments, and prediction of future markets. *Preq:* G C 406 and 444 or consent of instructor.

G C (THRD) 410, 610 Selected Topics 1-3 1(3-3) See THRD 410.

G C 440, H440, 640 Advanced Lithographic Methods 5(2,9) This course advances skills learned in previous graphic communications courses and applies the knowledge to large format presses. Students work from the design conception stage through all aspects of preparation, production, and finishing. Emphasis is placed on understanding and incorporating emerging technologies into the production workflow. *Preq:* G C 310 or equivalent.

G C 444, H444, 644 Current Developments and Trends in Graphic Communications 4(2,6) Advanced course for Graphic Communications majors. Emphasis is placed on the theory and technical developments that affect process and equipment selection. Topics for study include color theory and application, electronic color scanning, electronic prepress and communications, gravure color quality control and analysis. *Preq:* G C 350 and 406, 440.

G C 445, 645 Advanced Screen Printing Methods 3(2,3) In-depth study of the systems and materials used with the screen printing process. Emphasis is placed on techniques of control and procedures for establishing screen-printing methods and standards. *Preq:* G C 207 or consent of instructor.

G C 446, 646 Ink and Substrates 3(2,3) Course covers the components, manufacturing, process use as well as end use of ink and substrates used in lithography, flexography, gravure and screen printing. It examines the interrelationship between inks, substrates, and the printing process. Through controlled testing and examination, the optimum conditions for improved printability will be determined. *Preq:* G C 406 or 440 or consent of instructor.

G C 448, H448, 648 Planning and Controlling Printing Functions 3(3,0) Study of systems for setting printing production standards, estimating, scheduling, job planning, and the selection of new hardware and technologies. *Preq:* G C 350, 406, 440, 450.

G C 450 Graphic Communications Internship II 1(0,3) Continuation of G C 350. *Preq:* G C 350, 440, and/or consent of instructor.

G C 451 Special Projects in Graphic Communications 1-6(0,3-18) Advanced projects covering theory and/or practices going beyond the scope of regular coursework. Written project approval required before registering. *Preq:* Junior or Senior standing with three graphic communication courses completed.

G C 455 Graphic Communications Internship III 1(0,3) Full-time employment in an industry directly or indirectly related to printing. The work site and job must be approved in advance. *Preq:* GC 450 and two 400-level graphic communication courses.

G C 480 Senior Seminar in Graphic Communications 2(2,0) Study of the current trends and issues in the graphic communications industry. Class will center around group discussions dealing with relevant topics facing the graphic communications manager today. Students will be asked to draw upon academic experiences, internship experiences, and library research to facilitate discussion. Must be taken during the last semester on campus.

HEALTH

Professor: D. B. Jackson, *Chair; Associate Professor:* D. D. Phoenix, Jr.; *Assistant Professors:* K. A. Kemper, J. T. Long, C. T. Rainey, C. Y. Schwartz; *Lecturers:* D. J. Falta, J. F. Klein, T. S. Moore, J. Saccogna, L. Schwartz, J. S. Withtoft

HLTH 202 Introduction to Public Health 3(3,0) Examination of the forces that have influenced current health delivery systems, health practices and trends. General systems theory introduced. Health majors and minors will be given enrollment priority.

HLTH 240 Determinants of Health Behavior 3(3,0) Analysis of health behaviors based on psychological, social, cultural, and environmental factors. Introduction to health behavior theories. Health majors and minors will be given enrollment priority. *Coreq:* HLTH 298 or consent of instructor.

HLTH 250 Health and Fitness 3(3,0) Study of interrelationship between health and fitness. Emphasis on the cardiovascular system and benefits of exercise.

HLTH 298 Health Maintenance 3(3,0) Study of good health practices. Emphasis on lifestyles and measures of health. Health majors and minors will be given enrollment priority.

HLTH 301 Medications in Health 3(3,0) Exploration of the use of medications in the maintenance of health, with emphasis on the consumer's responsibility and informed decision making. *Preq:* A two-semester sequence in science or consent of instructor.

HLTH 303 Communication in Health Systems 3(3,0) Introduction to medical terminology, composing health reports, and health-funding proposals and media communications. *Preq:* HLTH 298.

HLTH 305 Body Response to Health Behaviors 3(3,0) Positive benefits and the negative impact of certain behaviors at cellular, organ, and body-system levels are examined. The pathways of selected injury and disease are explored. Expected physiological changes are applied in identifying strategies for promoting health in the presence (or absence) of disease. Health majors and minors will be given enrollment priority. *Coreq:* BIOSC 223/225 or consent of instructor.

HLTH 310 Women's Health Issues 3(3,0) Exploration of the specific health needs of women, with emphasis on understanding and prevention of problems of women's health. Health majors and minors will be given enrollment priority. *Preq:* A two-semester sequence in science or consent of instructor.

HLTH 320 Health Maintenance for Men 3(3,0) Exploration of the specific health maintenance needs of men, with emphasis on understanding and preventing problems of men's health. Health majors and minors will be given enrollment priority. *Preq:* A two-semester sequence in science or consent of instructor.

HLTH 340 Health Promotion and Education 3(3,0) Application of learning, change, and group theories as interventions for health behaviors. *Preq:* HLTH 240, 298.

HLTH H341 Health Promotion Seminar 1(2,0) Students enrolled in the Calhoun Honor's College may participate in this seminar designed to explore in-depth topics and problems presented in HLTH 340, utilizing appropriate models, such as PRECEDE/PROCEED, to analyze health-promotion strategies. To earn honor's credit, a student must be enrolled in HLTH 340 and earn a B or higher in both courses. *Coreq:* HLTH 340.

HLTH 350 Medical Terminology and Communication 3(3,0) Skills in building, analyzing, defining, pronouncing, and spelling medical terms related to the human body are developed and applied through electronic communication. *Preq:* Junior standing or permission of instructor.

HLTH 380 Epidemiology 3(3,0) Introduction to epidemiological principles and methods utilized in the study of the origin, distribution, and control of disease. Health majors and minors will be given enrollment priority. *Coreq:* Approved statistics course.

HLTH H381 Epidemiology Seminar 1(2,0) Provides students with the opportunity to use epidemiological principles and methods learned in HLTH 380 to analyze research findings and to apply the findings to health promotion. To earn honor's credit, a student must be enrolled in the corequisite HLTH 380 and earn a B or higher in both courses. *Preq:* An approved statistics course. *Coreq:* HLTH 380.

HLTH 398 Health Maintenance Appraisal 1(0,3) Utilizes laboratory experience to measure health risk, interpret laboratory health data, and design a personal health program. Health majors and minors will be given enrollment priority. *Preq:* HLTH 298.

HLTH 400, 600 Selected Topics in Health 1-3(1-3,0) Topics selected to meet special and individualized interest of students in health. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor, Junior standing.

HLTH 401, 601 Health Consumerism 3(3,0) Exploration of consumer decisions regarding health products and services with emphasis on strategies for decision-making. Health majors and minors will be given enrollment priority. *Preq:* A two-semester sequence in science or consent of instructor.

HLTH 402, 602 Principles of Health Fitness 3(3,0) Students apply current theories concerning physiological effects of exercise to select new populations; understand the relationship between exercise and various chronic diseases; and design, execute, and evaluate exercise programs in terms of safety and effectiveness. *Preq or Coreq:* HLTH 305, CPR certification.

HLTH 410, 610 Concepts of Health for Children 3(3,0) Focus on the analysis and evaluation of health problems commonly occurring in children. Emphasis will be on concepts of positive health behavior. Health majors and minors will be given enrollment priority. *Preq:* Developmental psychology requirement.

HLTH 411 Health Needs of High Risk Children 3(3,0) Analysis and evaluation of the health needs of high-risk families and special needs children will be developed from the prenatal period to age six. Emphasis will be on health prevention and early intervention strategies. Enrollment priorities will be provided to students enrolled in the Early Intervention Specialist minor. *Preq:* HLTH 410.

HLTH 415, 615 Public Health Issues in Obesity and Eating Disorders 3(3,0) An in-depth review of prevalences, risk factors, consequences and treatments of obesity and other eating disorders. This review will focus on the public health importance of cultural norms, prevention and early intervention as it relates to obesity and eating disorders. *Preq:* Junior standing in Health Science or permission of instructor.

HLTH 420, 620 Health Promotion and Wellness Internship 1-6(0,3-18) Under competent supervision in an approved agency, the student will have opportunity for on-the-job experiences. The student will select an agency and develop personal goals and objectives appropriate to the setting, population, and health issues. May be repeated for a maximum of six credits. To be taken Pass/Fail only. *Preq:* Minimum grade-point ratio of 2.5 and consent of instructor.

HLTH 430, 630 Health Promotion of the Aged 3(3,0) Course that will focus on an analysis and evaluation of health issues and health problems of the aged. Emphasis will be on concepts of positive health behaviors. Health majors and minors will be given enrollment priority. *Preq:* Developmental psychology; a two-semester sequence in science; or consent of instructor.

HLTH 431, 631 Public and Environmental Health 3(3,0) The principles of environmental health, with an emphasis on understanding various health concerns created by the interactions of people with their environment. Students will evaluate the impact of environmental factors on public health policy decisions. Meets specific area of need in environmental health issues.

HLTH 440 Managing Health Service Organizations 3(3,0) Exploration of the role of health professionals as a leader and activist. Study of legal, ethical, economic, political, and agent roles. *Preq:* Junior standing or permission of instructor.

HLTH 450, 650 Applied Health Strategies 4(3,3) Students plan, implement, and evaluate strategies to promote health through individual behaviors. Both healthful and unhealthful behaviors are included. Examples of strategies include smoking cessation, weight management, and exercise prescription. Includes fieldwork. *Preq:* HLTH 480.

HLTH 480 Community Health Promotion 4(3,3) Focus on health-promotion activities for community and population groups with emphasis on assessment, program planning, and evaluation. Includes fieldwork. *Preq:* HLTH 340, 380, 398 or consent of instructor.

HLTH H481 Community Health Promotion Seminar 1(2,0) Designed for students to evaluate health-promotion strategies and to differentiate theory and practice by examining classroom content and field experience. To earn honor's credit, a student must be enrolled in HLTH 480 and earn a B or higher in both courses. *Preq:* HLTH 340, H341. *Coreq:* HLTH 480.

HLTH 490 Research and Evaluation Strategies for Public Health 3(3,0) Discussion of research in health. Focus on analysis of reported research. Ethical, moral, and legal issues are discussed. *Preq/Coreq:* HLTH 380; statistics requirement.

HLTH H491 Research Internship 1(0,3) Students will collaborate in on-going faculty research programs to gain an awareness of the research process and role in a unique mentoring environment. Students will be able to apply theories and principles learned in HLTH 490 as they mentor with faculty. To earn honor's credit, student must be enrolled in the HLTH 490 and earn a B or higher in both courses. *Coreq:* HLTH 490.

HLTH 498, 698 Contemporary Health Problems 3(3,0) Critical examination of current and emerging health problems in contemporary society and the way in which these problems are presented in popular and scientific literature. Health majors and minors will be given enrollment priority. *Preq:* HLTH 298.

HISTORY

Professors: J. L. Arbena, C. K. Bleser, T. J. Kuehn, Chair; D. M. McKale, E. E. Moise, D. M. Nicholas, J. V. Reel, Jr., A. Schaffer, H. L. Suggs, R. A. Waller; *Associate Professors:* E. D. Carney, C. A. Grubb, P. E. Mack, S. G. Marks, R. L. Saunders, W. F. Steirer; *Assistant Professors:* E. R. Dale, H. M. Larebo, R. P. Leemhuis, R. R. Owens, S. M. Sinke, T. G. Young

HIST 100 Higher Education and Clemson 1(1,0) Introduction to higher education; its background and development in the western world, emphasizing land-grant institutions and Clemson University in particular.

HIST 101, H101 History of the United States 3(3,0) The political, economic, and social development of the American people from the period of discovery to the end of Reconstruction.

HIST 102, H102 History of the United States 3(3,0) Political, economic, and social development of the American people from the end of Reconstruction to the present.

HIST 122 History, Technology, and Society 3(3,0) Topics in the history of technology with an emphasis on how technology affects society and how society shapes technology. Emphasis will be on 19th and 20th century America, but some material from other periods of Western Civilization and other world regions may be discussed.

HIST 172, H172 Western Civilization 3(3,0) Political, economic, and social movements of Western civilization from ancient times to the 17th century.

HIST 173, H173 Western Civilization 3(3,0) Political, economic, and social movements of Western civilization from the 17th century to the present.

HIST 198 Current History 1(1,0) Examination of the major events and problem areas in the news with emphasis on their historical context and possible long-range significance. May be repeated for a total of three credits. Does not count toward the requirements of the major or minor in History.

HIST 200 Fort Hill Internship 1(0,1) Provides practical experience in public history museum work and historical preservation. May be repeated for a total of three credits. Cannot count toward the major or minor in History. To be taken Pass/Fail only. *Preq:* Consent of department chair.

HIST 300 History of Colonial America 3(3,0) Development of American institutions and customs in the period before 1776. Considerable emphasis is placed on the imperial relations between Great Britain and her colonies and upon the movement towards and the philosophy of the American Revolution.

HIST 301 American Revolution and the New Nation 3(3,0) Study of the various historical explanations leading to an understanding of the American Revolution, the establishment of the Nation under the Constitution, and the first decade of the new nation. Special emphasis will be placed upon developing an understanding of individual motivation and ideological development present during the last four decades of the 18th century.

HIST 302 Age of Jefferson, Jackson, and Calhoun 3(3,0) Formation and growing pains of the new nation through the Federal and Middle periods of its

history, with emphasis on economic and political development, the westward movement, and the conflicting forces of nationalism and sectionalism.

HIST 303 Civil War and Reconstruction 3(3,0) Study of the political, military, and social aspects of the sectional conflict and of the era of Reconstruction. Some emphasis will be placed on the historical controversies which the period has inspired.

HIST 304 Industrialism and the Progressive Era 3(3,0) Study of American society in the period between the 1880s and 1930s. This course emphasizes the effects of industrialization and urbanization on the American people.

HIST 305 The United States in the Age of the World Wars 3(3,0) An examination of the changes in the American experiences through two world wars, a depression, the Prohibition era and the assumption of international responsibilities.

HIST 307 Recent America 3(3,0) Examination of the American experience from the end of World War II through the period of the Korean and Vietnam wars, the Cold War, the Civil Rights movement, the counter-culture of the 1960s, assassinations and Watergate.

HIST 311 African Americans to 1877 3(3,0) Study of the African-American experience in the United States, from the African past through slavery to 1877.

HIST 312 African American History from 1877 to the Present 3(3,0) Study of African American experience in the United States, from 1877 to the present.

HIST 313, H313 History of South Carolina 3(3,0) Political, economic, and social development of South Carolina from 1670 to the present.

HIST 314 History of the South 3(3,0) Origins and development of political, economic, and cultural institutions of the South from the Colonial period to the present, and the role of the South in the nation's development.

HIST 316 American Social History 3(3,0) Study of American society, including the relationship among classes, ethnic groups, regions, and sexes, from the Colonial period to the present.

HIST 318 History of American Women 3(3,0) Survey course of the history of American women emphasizing the changing role of women in American culture and society.

HIST 321 History of Science 3(3,0) Survey of the development of science in the Western world, emphasizing the period from the Renaissance to the present.

HIST 322 History of Technology 3(3,0) Formerly HIST 309. History of the major developments in Western technology and their relationships to the societies and cultures in which they flourished.

HIST 323 History of American Technology 3(3,0) Formerly HIST 310. History of developments in technology and their role in American life with particular emphasis on the American Industrial Revolution and the 20th century.

HIST 325 American Economic Development 3(3,0) Formerly HIST 306. Economic development of the United States from Colonial to recent times, emphasizing the institutional development of agriculture, banking, business and labor, and government regulations and policy.

HIST 327 American Business History 3(3,0) Survey of the history of American business by using a case-study approach. The focus will be placed upon the effects that policies and institutions have on individual businesses.

HIST 328 United States Legal History to 1890 3(3,0) Survey of the American legal system in its historical perspective, from Colonial times to 1890. Emphasis will be placed on the relationship between law and society, the way in which the practice of law changed American society, and the way in which social development affected both the theory and practice of the law.

HIST 329 United States Legal History Since 1890 3(3,0) Examination of the social, cultural, intellectual, economic, and political forces that have helped shape the law in the United States since 1890.

HIST 330 History of Modern China 3(3,0) Growth and development of Chinese civilization from ancient times to the present. Emphasis in the course is on 20th century China, particularly since the rise to power of the Communist regime.

HIST 333 History of Modern Japan 3(3,0) The origin and development of Japanese civilization with particular emphasis on modern Japan from mid-19th century to the present.

HIST 338 African History to 1875 3(3,0) Students will study sub-Saharan Africa in the period from antiquity to European colonial rule by exploring the development of Stone Age cultures; agricultural and pastoral societies; ancient civilizations; political, economic, and social systems; gradual shift of initiative from the interior to the coast; and various slave trades.

HIST 339 Modern Africa, 1875 to the Present 3(3,0) Students will study sub-Saharan Africa from 1875 to the present, with the focus placed upon the development and decline of European imperialism, dilemmas of African independence, and ethnic struggles in Southern Africa.

HIST 340 Ancient Americans 3(3,0) Introduction to the geography of the Western Hemisphere; origin of human life in the Americas; structure and accomplishments of the major pre-Columbian societies, with an emphasis on the rise and decline of the Classic civilizations; the impact of the European conquest; the formation of a new Ibero-American culture.

HIST 341 Modern Mexico 3(3,0) Introduction to the geography of the region, origins, and progress of the Independence movements and political, economic and social developments after 1825; current domestic and international problems.

HIST 342 South America Since 1800 3(3,0) Introduction to the geography of the region; origins and progress of the Independence movements; political, economic and social developments after 1825; current domestic and international problems.

HIST 351 Ancient Near East 3(3,0) History of the peoples and civilizations of the Near East from the Sumerians to the establishment of Roman power in this region. Geography, mythology, religious and economic currents, as well as the methods and discoveries of archaeology will be included.

HIST 354 The Greek World 3(3,0) Study of Greek civilization from its beginning until the time of the Roman conquest, concentrating on the social institutions of the Greek city-states.

HIST 355 The Roman World 3(3,0) The rise of Rome to world empire and the international civilization it dominated. Concentration on the nature of the political change from Republic to monarchy with particular emphasis on city life and the causes of its decline.

HIST 361 History of England to 1688 3(3,0) The evolution of English political, social, economic, and cultural institutions to the 17th century. (Study Abroad)

HIST 363 History of England Since 1688 3(3,0) The evolution of English political, social, economic, and cultural institutions from the 17th century to the present.

HIST 365 English Cultural History 3(3,0) [W.2] Survey of the cultural history of England, from Anglo-Saxon times to the present, focusing on the period after the English Renaissance.

HIST 370 Medieval History 3(3,0) Survey of the period from the eclipse of Rome to the advent of the Renaissance, emphasizing human migrations, feudalism, rise of towns, and cultural life.

HIST 372 The Renaissance 3(3,0) Examination of the transitional period of European civilization (ca. 1300-1500), with emphasis on institutional, cultural, and intellectual developments.

HIST 373 Age of the Protestant Reformation 3(3,0) Evolution of Modern Europe (ca. 1500-1660), as affected by the Reformation, wars of religion and growth of nation-states. The study will include intellectual advances and the beginnings of European expansion overseas.

HIST 374 Europe in the Age of Reason 3(3,0) Study of the quest for order and the consolidation of the European state system between 1660 and 1789 with emphasis on the idea of absolutism, the question of French hegemony, and the synthesis of the 18th-century Enlightenment.

HIST 375 Revolutionary Europe 3(3,0) History of Europe from the outbreak of the French Revolution through the Revolutions of 1848, with emphasis on the conflict between the forces of change and those of conservatism, within the states and in Europe in general.

HIST 377 Europe, 1914-1945 3(3,0) Course will focus upon Europe during two major wars and the peacetime adjustments Europeans made, or failed to make, during the twenty-year interim between those wars.

HIST 378 Europe Since 1945 3(3,0) Course will focus upon how World War II completed the destruction of European global hegemony, creating a bipolar continent with the west dominated by the United States and the east by Soviet Russia; and how Europe adjusted to this situation.

HIST 380 Imperial Germany 3(3,0) German history from the beginning of the German Empire, 1870-71, through World War I. This course emphasizes the influence of militarism, nationalism, anti-Semitism and xenophobia on the German culture and political process.

HIST 381 Germany Since 1918 3(3,0) German history from the time of Germany's defeat in World War I, through the Nazi period and World War II. This course culminates with the study of a divided Germany.

HIST 384 History of Modern France 3(3,0) French history from the mid-19th century to the present with particular emphasis on France since 1900.

HIST 385 History of Imperial Russia 3(3,0) Survey of the formative years of the Russian Empire from the time of accession of Peter the Great to the time of the Russian Revolution. Social, political, diplomatic, and intellectual developments will be given equal treatment in the course.

HIST 386 History of the Soviet Union 3(3,0) Soviet history from the revolution to the present. Surveys the creation and subsequent development of the communist political and social system, with attention given to culture and diplomacy.

HIST 387 The Russian Revolution 3(3,0) History of one of the most formative series of events of the 20th century. Course follows the crisis of Imperial Russia, its downfall during World War I, and subsequent revolutionary upheaval leading to the formation of the USSR.

HIST 390 Modern Military History 3(3,0) Survey of the development of modern warfare, and the influence of technological change on warfare. Particular attention will be given to the major conflicts of the 20th century.

HIST 391 Post World War II World 3(3,0) The world in the age of the Cold War, the breakdown of the colonial empires, and racial, religious, ethnic, national, and social tensions. The United States will provide the central core to the class.

HIST (F&R) 392 History of the Environment of the United States 3(3,0) Examination of the historical development of the attitudes, institutions, laws, people, and consequences that have affected the environment of the United States from pre-Columbian days until the present. Emphasis will be placed on the interaction of human beings within and with the environment.

HIST 393 Sports in the Modern World 3(3,0) An analysis of the global evolution and diffusion of sports in the industrial age, with an emphasis on the linkage of sports structure and performance to the larger social context.

With departmental consent, any 400- or 600-level course in history may be repeated one time for credit. The 400-level courses require students to do historical research and writing.

HIST 400, 600 Studies in United States History 3(3,0) Topics and problems in the history of the United States from the Colonial era to the present.

HIST 438, 638 Problems in African Historiography and Methodology 3(3,0) Course will concentrate upon major issues in the field of African history with an additional focus being placed upon methodological concerns.

HIST 440, 640 Studies in Latin American History 3(3,0) Consideration of selected and varied topics in Latin American history through readings, class discussions, and individual or group projects. Special attention will be given to the use of an inquiry or problem-solving method of historical analysis and to the cultivation of a comparative perspective.

HIST 450, 650 Studies in Ancient History 3(3,0) Selected topics in the field of ancient history ranging from pre-Biblical times to the fall of the Roman Empire.

HIST 460, H460, 660 Studies in British History 3(3,0) Examination of selected themes, topics, or periods in British history from Anglo-Saxon times to the present.

HIST 470, 670 Studies in Early European History 3(3,0) Study of selected topics or themes in European history from the fall of the Roman Empire to the age of industrialization.

HIST 471, H471, 671 Studies in Modern European History 3(3,0) Study of selected topics or problems in European history from the end of the Old Regime to the present.

HIST 490 Senior Seminar 3(3,0) Seminar in current research themes in history. Students will do directed research on a particular topic. Seminar topics will vary from section to section and from semester to semester. *Preq:* Senior standing or consent of instructor.

HIST 491, H491, 691 Studies in the History of Science and Technology 3(3,0) Selected topics in the development of science and technology, with emphasis on their social, political and economic effects.

HIST 492, 692 Studies in Diplomatic History 3(3,0) Selected topics and problems in international conflict and conflict resolution among nations. Concentration will usually be in 20th century history.

HIST 493, 693 Studies in Social History 3(3,0) Studies in the ways people have earned their livings and lived their lives, individually and as communities, in the confines of different societies.

HIST 494, 694 Studies in Comparative History 3(3,0) Selected topics in comparative history, contrasting and comparing similar historic developments in different nations, geographic areas, or civilizations.

HIST 495, 695 Studies in the History of Ideas 3(3,0) Selected topics and themes in the development of ideas that have had an impact on the behavior of individuals and civilizations.

HIST 496, 696 Studies in Legal History 3(3,0) Study of selected problems in the development of law and the system of criminal and civil justice.

HIST H497 Senior Honors Research 3(3,0) Research for the preparation of senior honors thesis. *Preq:* Senior standing and successful completion of a 400-level history course and approval of the Department of History.

HIST H498 Senior Honors Thesis 3(3,0) Writing of the senior honors thesis. *Preq:* HIST H497.

HIST 499 Independent Study 1-3(1-3,0) Study of selected problems in history under the direction of a faculty member chosen by the student. The student and faculty member develop a course of study designed for the individual student and approved by the department chair prior to registration.

HORTICULTURE

Professors: D. W. Bradshaw, J. A. Brittain, D. R. Decoteau, R. G. Halfacre, M. T. Haque, J. W. Kelly, Chair; A. R. Mazur, B. B. Rhodes, T. Whitwell; *Associate Professors:* W. V. Baird, J. D. Caldwell, W. B. Miller, W. C. Olien, A. J. Pertuit, Jr., D. F. Wagner; *Assistant Professor:* J. W. Adelberg

HORT 101 Horticulture 3(3,0)F Environmental factors and horticultural practices affecting optimum production of floral, fruit, ornamental, and vegetable crops. Survey of the various areas of horticulture and their importance to society.

HORT 202 Selected Topics 1-3(1-3,0) Introduction to developing trends/concepts/technologies in horticulture. May be repeated for a maximum of three credits or a maximum of three credits in combination with HORT 400, but only if different topics are covered. *Preq:* Consent of instructor.

HORT 208 Landscape Appreciation 3(3,0)S Designed to deepen the student's appreciation of our natural and built environments through a study of landscape elements, styles, and professions. Landscapes ranging in scale from residential to regional are critiqued, and design principles and landscape ethics are discussed.

HORT 271 Internship 1-6(0,2-12) Preplanned, practical and supervised work experience designed to give beginning students on-the-job learning opportunities that will support their classroom experience. Students will submit monthly reports and present a departmental internship seminar. Undergraduates may accumulate a maximum of six credits for participation in HORT 271 and/or 471. *Preq:* Consent of instructor.

HORT 303 Plant Materials 3(2,3)F Woody, ornamental plants and their aesthetic and functional uses in landscape developments. The study covers habit of growth, ultimate size, texture effect, period of bloom, color, and cultural requirements.

HORT 304 Annuals and Perennials 3(2,3)S Annual and perennial flowers' aesthetic appeal and functional uses and needs. Color, texture, bloom time, form, size and growth requirements as they relate to designing, planting, and maintaining colorful landscapes. *Preq:* HORT 208, 303, or consent of instructor.

HORT 305 Plant Propagation 3(2,3)F All phases of plant propagation from seeds, bulbs, divisions, layers, cuttings, budding, and other types of grafting are comprehensively treated. Timing, manner and material for making cuttings; temperature and media requirements and propagation structures for rooting cuttings of ornamental and fruit trees, shrubs, and indoor plants will be studied.

HORT 308 Landscape Design 4(3,3)F Landscape planning of residential and public properties in order to achieve best use and most enjoyment from a given piece of ground. *Preq:* HORT 208, 303, or consent of instructor.

HORT 310 Greenhouse Crop Physiology 3(2,3)S Physiology, growth and development of floriculture crops in fully or semi-controlled environments, including manipulation of flowering, chemical and environmental height regulation, fertility in artificial substrates, scheduling, cost analysis, and pest management. *Preq:* AGRON 202, HORT 101, or consent of instructor.

HORT 352, 652 Tree Fruit Culture and Physiology 3(2,3)F Fruit bud formation, rest period and water relations of fruit plants, soils, fruit setting; orchard soil management and responses of various fruits to fertilizers; principles of pruning, effect of climatic differences, freezing of tissues and means of avoiding injury; harvesting, transportation, and storage. *Preq:* HORT 101 or consent of instructor.

HORT 400 Selected Topics 1-3(1-3,0) Presents an in-depth examination of developing trends/concepts/technologies in horticulture. May be repeated for a maximum of three credits or a maximum of three credits in combination with HORT 202, but only if different topics are covered. *Prq:* Junior standing or consent of instructor.

HORT 406, 606 Nursery Technology 3(2,3) Principles and techniques in handling nursery crops. *Prq:* HORT 303, 305.

HORT 408 Special Problems in Horticulture 1-3(0,3-9) Independent investigation in horticulture. Emphasis will be placed on organizing a quality proposal, conducting the investigation, and reporting of findings at a professional society meeting and/or in a professional publication. Cumulative maximum of three credits. *Prq:* Minimum of 75 hours completed and consent of instructor.

HORT 409 Seminar 1(1,0) Recent research work on various phases of horticulture, methods of conducting investigations, and preparation of report of investigations.

HORT 412, 612 Turfgrass Management 3(2,3) Studies of warm and cool season turfgrasses in relation to value, use, regional adaptation, establishment, soils, and cultural practices. The influence of environmental, cultural, and genetic factors on turf quality and serviceability. Identification of grass and weed species and discussion of programs for the management of lawns, parks, roadsides, and golf courses. *Prq:* BIOL 103 or equivalent.

HORT 415, 615 Foliage Plants for Interior Utilization 3(2,3) Application of foliage plant requirements for their selection and maintenance in interior environments. Laboratories include plant identification, experiment, and graphic representation. *Prq:* BIOSC 205/206, HORT 101 and consent of instructor.

HORT 416 Floral Design 2(1,3) Topics covered include simple arrangements (history, containers, mechanical aids, etc.), arrangements for specific occasions, church arrangements, funeral designs, bride's bouquets, dried arrangements and flower preservation, corsage work, foliage arrangements, bonsai, terrarium, Christmas wreaths, and foliage plant identification. *Prq:* BIOL 103 or equivalent.

HORT (AGRON) 433, 633 Integrated Weed Management for Agronomic and Horticultural Crops 3(2,2) Weed management systems consisting of cultural, chemical, and biological methods will be studied for the major agronomic and horticultural crops of South Carolina with problem-solving methodology and herbicide injury diagnosis. *Prq:* AGRON 407 or equivalent introductory weed science.

HORT 455, 655 Small Fruit Crops 3(2,3) In-depth survey of taxonomical, morphological, and physiological characteristics of small fruit crops as they relate to the study of horticultural characteristics, culture, production, harvesting, and handling of both commercial and home-grown grapes, blueberries, strawberries, brambles, and kiwifruit. *Prq:* HORT 101 or consent of instructor.

HORT 456, 656 Vegetable Crops 4(3,3) Principles and practices employed in the commercial growing and marketing of vegetable crops with emphasis on plant characteristics, cultivars, management practices, harvest, quality factors and

grading, storage, economic importance, and areas of production.

HORT 461, H461, 661 Problems in Landscape Design 4(3,3) Landscape planning for larger residential properties, schools, industrial plants, real estate developments; detailed finished plans; further study of materials used; original problems; field study. *Prq:* HORT 308, 407, or consent of instructor.

HORT 464, 664 Postharvest Horticulture 3(2,2) Study of the biological aspects of methods and practices relating to the harvesting, handling, transportation, and storage of horticultural commodities for fresh market. Topics include an introduction to postharvest physiology, concept of quality and its measurement, standard and innovative postharvest treatments, grades and standards, and various storage methods.

HORT (BIOSC) 465, 665 Plant Molecular Biology 3(3,0) See BIOSC 465.

HORT 470, 670 Horticulture and Human Well-Being 3(2,3) The role of horticulture in human well-being (physical and mental) will be emphasized. Adaptive horticultural techniques and activities suitable for individuals with special needs (impaired, disabled, handicapped) will be presented. Students will plan, perform, and report on supervised and independent horticultural activities with selected special individuals or groups.

HORT 471, 671 Advanced Internship 1-6(0,2-12) Preplanned work experience under competent supervision in approved agency dealing with horticultural endeavors. Designed to give advanced students on-the-job learning opportunities to apply acquired knowledge and skills. Monthly reports and final departmental seminar required. Undergraduates may accumulate a maximum of six credits for participation in HORT 271 and/or 471. *Prq:* Junior standing and consent of instructor.

HORT 472, 672 Garden Experiences in Youth Development 2(1,3) Exploration of the role of gardening and related outdoor experiences in enhancement of educational development, self-esteem and pro-social behavior in elementary school children. *Prq:* Senior standing and consent of instructor.

HOSPITAL AND HEALTH SERVICES ADMINISTRATION

H ADM 408, 608 Hospital and Health Services Administration 3(3,0) Survey of how hospital and health-care administration is practiced within the United States. Topics include planning; social, legal, and political considerations; alternate forms of organization; management practices; control systems; and trends/issues facing the future of health-care administrators. *Prq:* Senior or graduate-level standing or consent of instructor.

H ADM 410, 610 Hospital Internship 3(0,9) The student will spend nine hours per week on a specified program of observing, practicing and experiencing the duties of hospital administrators in selected local hospitals. The course will be specifically outlined along with the amount of time the student will spend in each phase or department of the hospital. Student progress will be constantly monitored by University faculty and hospital staff. *Prq:* H ADM 408.

HUMANITIES

Professors: S. K. Eisiminger, E. A. Freeman; *Assistant Professors:* A. Bennett, A. L. Low

HUM 301 Humanities 3(3,0) Introduction to humanistic studies focusing on relationships among disciplines—painting, sculpture, architecture, music, literature, philosophy, and drama—beginning with prehistory and continuing to the Renaissance.

HUM 302 Humanities 3(3,0) Introduction to humanistic studies focusing on relationships among disciplines—painting, sculpture, architecture, music, literature, philosophy, and drama—beginning with the 17th century and continuing to the present.

HUM 306 Creative Genius in Western Culture 3(3,0) Investigation of creativity through study of great innovators in art, literature, music and ideas. May be repeated once for credit.

HUM 309 Studies in Humanities 3(3,0) Interdisciplinary approach to the humanities. Special subject matter varies according to the instructor and as approved by the head of the English Department. May be repeated once for credit.

INDUSTRIAL ENGINEERING

Professors: R. P. Davis, W. J. Kennedy, D. L. Kimblier, Chair; M. S. Leonard; *Associate Professors:* W. G. Ferrell, Jr., J. S. Greenstein; *Assistant Professors:* B. R. Cho, A. K. Gramopadhye, B. J. Melloy

I E 201 System Design 1 3(3,0) Introduction to the design of industrial engineering systems. Design methodologies will be introduced in the context of a design process that includes determining user needs and demands, establishing system functions, specifying system requirements, conceptual design and detailed design. *Prq:* ENGR 180 and PHYS 122. *Coreq:* E G 209 or consent of instructor.

I E 210 Design and Analysis of Work Systems 4(3,3) Facilities planning and design, workplace design, ergonomics of workplace design, performance measurement and methods engineering. *Coreq:* MTHSC 302.

I E 250 Modeling and Analysis for Industrial Engineers 3(3,0) Model development and problem-solving techniques in applied mathematics from an industrial engineering perspective. *Prq:* MTHSC 206. *Coreq:* MTHSC 302.

I E H300 Junior Honors Seminar 0 Course designed to acquaint students enrolled in the Industrial Engineering Departmental Honors Program with current research issues in the profession. This will assist the student in preparing a research proposal for the senior thesis. *Prq:* Admission to Departmental Honors Program and Junior standing.

I E 306 Manufacturing Processes 3(2,3) The basic structure of modern manufacturing processes and material properties related to manufacturability, with emphasis on metal cutting, metal working, molding, joining, and finishing. *Prq:* Sophomore engineering standing or consent of instructor.

I E 320 Design of Information Systems in Industrial Engineering 3(2,3) Introduction to object-oriented programming principles and their use in human-centered system design. *Prq:* ENGR 120.

- I E 340, H340 Systems and Flows 3(2,3)** Systems concepts; modeling, design and analysis of network flows involving material and information, in production and service systems. *Preq:* MTHSC 208, M E 310.
- I E 361 Industrial Quality Control 4(3,3)** Quality engineering techniques focusing on process control using statistical methods including control charts and acceptance sampling. *Preq:* MTHSC 302.
- I E 374 Advanced Manufacturing Systems 3(3,0)** Study of the state-of-the-art automated manufacturing systems, CAD/CAM, computer-integrated manufacturing, advanced 3-D computer controlled machining systems, adaptive control, group technology, and flexible manufacturing systems. *Preq:* I E 306 or consent of instructor.
- I E 380 Methods of Operational Research I 3(3,0)** Introduction to operations research models, including linear programming, integer linear programming, transportation and assignment problems and network flows. *Preq:* MTHSC 206.
- I E 381 Methods of Operational Research II 3(3,0)** Probabilistic modeling of engineering systems. Topics include calculus-based probability, decision analysis, Markov processes, queueing and reliability. *Preq:* MTHSC 208.
- I E 384, H384 Engineering Economic Analysis 3(3,0)** Basic principles and techniques of economic analysis of engineering projects. Consideration of time value of money, short- and long-term investments, replacement analysis, depreciation methods, cost allocation and measures of cost effectiveness. *Preq:* MTHSC 108.
- I E 401, 601 Work Methods and Measurement II 3(2,3)** Predetermined basic motion-time data analysis of work methods for synthesis of effective work methods and standards development. Methods-Time Measurement (MTM) is presented in detail to permit application proficiency. Standard data development, using a variety of techniques is covered with emphasis on the use of stepwise multiple regression analysis. A design project is required. *Preq:* I E 210 and MTHSC 405 or consent of instructor.
- I E 422, 622 Expert Systems 3(3,0)** Introduction to the concepts and methodologies associated with expert system development and utilization. Emphasis is placed on providing an industry-oriented perspective, including topics such as language selection, application considerations and implementation. *Preq:* Junior standing in Engineering.
- I E 452, 652 Reliability Engineering 3(3,0)** Probabilistic approach to assessing system reliability. Methods for analyzing serial, parallel, and complex systems. Reliability life testing and its acceleration are covered. Essential elements of maintainability are identified and related to system availability. *Preq:* MTHSC 206 and 405 or consent of instructor.
- I E 460, H460, 660 Quality Improvement Methods 3(3,0)** Study of modern quality improvement techniques presented in an integrated, comprehensive context. *Preq:* Senior standing.
- I E 461, 661 Quality Engineering 3(3,0)** Design aspects of quality and the engineer's role in problems of quality in production systems. *Preq:* I E 361.

- I E 465, H465, 665 Facilities Planning and Design 3(3,0)** Study of the principles and techniques of plant layout. Economic selection of materials handling equipment and integration of this equipment into the layout plan to provide effective product flow. Quantitative techniques for evaluation of facilities plans. A design project is required. *Preq:* I E 210, 361, 380, 381, 384.
- I E 467 System Design II 3(2,3)** Provides the student with the challenge of integrating and synthesizing general engineering knowledge into creatively solving real-world, open-ended problems. This includes developing the problem statement, objectives, and criteria; data collection; technical analysis; developing and integrating recommendations; and presenting results. *Preq:* I E 201, 210, 340, 384, 461.
- I E 468 Design Problems in Industrial Engineering 1(1,0)** Seminar designed to accompany I E 467. Industrial Engineering case studies are explored with emphasis placed on integrating appropriate analysis tools and design techniques to achieve rational and functional solutions. *Preq:* Concurrent enrollment in I E 467.
- I E 473, 673 Microcomputer Applications in Industrial Engineering 3(2,3)** Introduction to microcomputer-processor fundamentals, software and hardware as these relate to process control, robotics, and computer-integrated manufacturing. Applications demonstrated by laboratory projects. *Preq:* I E 306 or consent of instructor.
- I E 482, 682 Systems Modeling 3(3,0)** Modeling of discrete industrial systems using a digital computer. The purpose, theory, and techniques of system modeling are presented. *Preq:* I E 381 and MTHSC 302 or consent of instructor.
- I E (AG E, E) 484, 684 Municipal Solid Waste Management 3(3,0)** See I E 484.
- I E 485, 685 Industrial Systems Engineering 3(3,0)** Modeling and analysis of multistage decision processes, recursive optimization, process and system design and control problems. *Preq:* I E 380 and 381 or consent of instructor.
- I E 486, H486, 686 Production Planning and Control 3(3,0)** Fundamentals of forecasting demand, scheduling production, and controlling the movement and storage of material associated with production are studied. State-of-the-art manufacturing techniques will be discussed. A design project is required. *Preq:* I E 380 and 384.
- I E 487, 687 Industrial Safety 3(3,0)** Recognition and prevention of hazards. Recognition and control of hazardous materials. Developing and managing a safety program. Designing inherently safe equipment and workplaces. *Preq:* Junior standing.
- I E 488, 688 Human Factors Engineering 3(3,0)** Introduction to design for human use. Information about human performance, abilities, and limitations will be surveyed and applied to the design of tools, machines, facilities, tasks and environments for efficient, safe, and comfortable human use. *Preq:* MTHSC 302 or equivalent or consent of instructor.
- I E 489, 689 Industrial Ergonomics 3(2,3)** Presentation of the theory and practice of ergonomic principles in the industrial setting. Emphasis is placed on the classic ergonomic problems of work place and work space design, manual materials

handling, physically demanding jobs, environmental factors, and human error. Emerging areas such as design for disabled workers are addressed. *Preq:* I E 488 or consent of instructor.

I E 491, H491, 691 Selected Topics in Industrial Engineering 1-3(0-3,0-9) Comprehensive study of any timely or special topic in industrial engineering not included in other courses. May be repeated for a total of six credits. *Preq:* Consent of instructor.

I E 492, H492, 692 Design Topics in Industrial Engineering 1-3 Comprehensive study of any timely or special design topic in industrial engineering. May be repeated for a total of six credits. *Preq:* Consent of instructor.

INTEGRATED PEST MANAGEMENT

Professor: J. A. Brittain

IP M 401, 601 Principles of Integrated Pest Management 3(3,0) Origins, theory, and practice of integrated pest management. Relationships among crop production and protection practices are explored. Economics of various control strategies are considered. Integrated pest management field projects are studied. Conventional and integrated pest management approaches are compared. Multidisciplinary plant problem analysis is introduced. *Preq:* AGRON 407, ENT 301, PL PA 401, or consent of instructor.

ITALIAN

Assistant Professor: B. M. Zaczek

- ITAL 101 Elementary Italian 4(3,1)** Introductory course stressing grammar, pronunciation, oral practice, and reading skills. Attention is given to practical everyday living as well as cultural considerations.
- ITAL 102 Elementary Italian 4(3,1)** Continuation of ITAL 101. *Preq:* ITAL 101 or consent of instructor.
- ITAL 201, H201 Intermediate Italian 3(3,0)** Intermediate course to build on the foundation of previous language courses, with practice in listening, speaking, reading and writing. Introduction to cultural perspectives through readings of literary prose selections. *Preq:* ITAL 102.
- ITAL 202, H202 Intermediate Italian 3(3,0)** Increasingly difficult readings in Italian literature, supplemented with classroom discussions and compositions. *Preq:* ITAL 201.
- ITAL 305 Intermediate Italian Conversation and Composition 3(3,0)** Practice in the written and spoken language with emphasis on vocabulary, pronunciation, and comprehension. *Preq:* ITAL 202 or consent of department chair.
- ITAL 307 Italian Civilization and Culture 3(3,0)** Study of the significant aspects of Italian civilization and culture through analysis of literary texts, paintings, films, and magazine articles. *Preq:* ITAL 202 or consent of department chair.
- ITAL 398 Directed Reading 1-3(1-3,0)** Directed study of selected topics in Italian literature, language, and culture. May be repeated for a total of six credits. *Preq:* Consent of department chair.

JAPANESE

Associate Professor: T. Kishimoto

JAPN 101 Elementary Japanese 4(3,1) Course for beginners in which the fundamentals of the language are taught and a foundation is provided for further study and the eventual ability to read and speak the language. The Japanese writing system will be introduced. Students will learn how to recognize and write the two alphabets HIRAGANA and KATAKANA. Three hours a week of classroom instruction and one hour a week in the language laboratory.

JAPN 102 Elementary Japanese 4(3,1) Continuation of JAPN 101. Students will study Kanji characters. *Prq:* JAPN 101.

JAPN 190 Study and Travel Abroad Preparation 1(1,0) Designed to prepare students for study/travel in Japan. Students will be sensitized to cross-cultural differences and will be provided with practical skills and sources of information. Taught mainly in English. To be taken Pass/Fail only. *Prq:* Consent of instructor.

JAPN 201 Intermediate Japanese 3(3,0) A brief review of JAPN 101 and 102, with conversation, composition and beginning or more serious reading of Japanese in short stories. Students study Kanji characters. *Prq:* JAPN 102.

JAPN 202 Intermediate Japanese 3(3,0) A brief review of JAPN 201, with conversation, composition, and dictation based on more difficult Japanese reading selections; includes a continuation of Kanji characters. *Prq:* JAPN 201.

JAPN 305 Japanese Conversation and Composition 3(3,0) Practice in the spoken language with emphasis on vocabulary, Kanji, pronunciation, and comprehension. Learning practical language skills and intercultural communication through various topics. *Prq:* JAPN 202 or consent of department chair.

JAPN 306 Japanese Conversation and Composition 3(3,0) Continuation of JAPN 305. More practice in the spoken language with emphasis on vocabulary, Kanji, pronunciation, and comprehension. Learning practical language skills and intercultural communication through various topics. *Prq:* JAPN 305 or consent of department chair.

JAPN 307 Japanese Civilization I 3(3,0) Study of the significant aspects of the culture of Japan. *Prq:* JAPN 202 or consent of department chair.

JAPN 308 Japanese Civilization II 3(3,0) Study of significant aspects of the culture of Japan. *Prq:* JAPN 202 or consent of department chair.

JAPN 316 Japanese for International Trade I 3(3,0) Spoken and written Japanese common to the Japanese-speaking world of business and industry, with emphasis upon business practices and writing and translating business letters and professional reports. Cross-cultural references provide opportunity for comparative and contrastive analysis of American and Japanese cultural patterns in a business setting. *Prq:* JAPN 306 or consent of department chair.

JAPN 398 Directed Reading 1-3(1-3,0) Directed study of selected topics in Japanese literature, language, and culture. May be repeated for a maximum of six credits. *Prq:* Consent of department chair.

JAPN 411 Studies in the Japanese Language I 3(3,0) Advanced training in the spoken and written language with emphasis on formal expressions. *Prq:* JAPN 306 or consent of department chair.

JAPN 412 Studies in the Japanese Language II 3(3,0) In-depth study of Kanji characters. *Prq:* JAPN 411 or consent of department chair.

JAPN 416 Japanese for International Trade II 3(3,0) Study of language and cultural environment of the Japanese-speaking market, including the linguistic and cultural idioms which support global marketing in general, and the international marketing of textiles, agricultural products, and tourism in particular. *Prq:* JAPN 316 or consent of department chair.

LANDSCAPE ARCHITECTURE

Professor: D. L. Collins; *Associate Professors:* F. F. Chamberlain, L. Tai; *Adjunct Professor:* G. Vander Mey; *Lecturer:* S. Sonnenberg

LARCH 262 Landscape Architectural Technology I 3(2,2) Lecture/studio course on the technological aspects of landscape architecture, including design grading and drainage, site information gathering and analysis, horizontal and vertical alignments of walks and roadways, structures of landscape architecture, irrigation design, pools and fountains, and lighting. *Prq:* DESIGN 251 and Sophomore standing or consent of program head.

LARCH 351 Landscape Architecture Design I 6(1,10) Studio work with adjunct demonstrations and lectures concerned with intermediate landscape architectural design problems. *Prq:* DESIGN 252, 254.

LARCH 352 Landscape Architecture Design II 6(1,10) Continuation of LARCH 351. *Prq:* LARCH 351.

LARCH 362 Landscape Architectural Technology II 3(2,2) Continuation of LARCH 262. *Prq:* DESIGN 251 and sophomore standing and AG M 301 or consent of program head.

LARCH 421 Landscape Architectural Seminar 3(3,0) Lectures and seminars dealing with pertinent topics related to environmental, technological and theoretical issues in landscape architecture, land planning, and urban design. *Prq:* Senior standing or consent of instructor.

LARCH 451 Landscape Architecture Design III 6(1,10) Studio work with adjunct demonstrations and lectures concerned with advanced landscape architectural design problems. *Prq:* LARCH 352.

LARCH 452 Landscape Architecture Design IV 6(1,10) Continuation LARCH 451. *Prq:* LARCH 451.

LARCH 462 Landscape Architectural Technology III 3(2,2) Continuation of LARCH 362. *Prq:* LARCH 362.

LARCH 490 Directed Studies and Projects in Landscape Architecture 1-5(0,3-15) Comprehension studies and/or research of special topics not covered in other landscape architectural courses. *Prq:* Junior standing and consent of department chair.

LARCH 552 Professional Landscape Architectural Design 6(0,14) Complex problem-solving projects involving regional design analysis and

planning, city planning and urban design, complex building relationships, and intense site utilization and design. May be repeated for a maximum of 12 credits.

LARCH 562 Landscape Architectural Technology IV 2(0,4) Studio course for the integration of design and technology. *Prq:* LARCH 462, professional standing. *Coreq:* LARCH 552.

LARCH 581 Landscape Architectural Professional Practice 3(3,0) Lecture course dealing with general consideration of landscape architectural office procedures. Study of the professional relationships of the landscape architects to client and contractor including problems of ethics, law, and business. *Prq:* Professional standing or consent of instructor.

LANGUAGE

LANG 191 Working/Internships Abroad Survey 1(1,0) Survey designed to familiarize students going abroad for work/internships with various international work environments. To be taken Pass/Fail only. *Prq:* Consent of instructor.

LANGUAGE AND INTERNATIONAL TRADE

Professors: J. I. Suarez, *Coordinator;* *Associate Professors:* E. P. Arnold, J. C. Bednar, P. R. Heusinkveld, T. Kishimoto; *Assistant Professors:* C. L. Chavez, D. Lepetit, C. Tisnado

L&IT 127 Introduction to Language and International Trade 1(1,0) Survey of the nature of international trade and related career opportunities. Information and applications of specific relevance to tourism, agriculture, forest products, and textile industries will be offered. To be taken Pass/Fail only.

L&IT 400 Language and International Trade Internship 1-3 A one-semester, full-time (or equivalent part-time) work assignment which provides the opportunity for the student to extend theoretical classroom learning through work experience in an appropriate setting. A final report is required. May be repeated for a total of six credits. To be taken Pass/Fail only. *Prq:* FR 316, GER 316, or SPAN 316 and 12 semester hours in a Language and International Trade technical option.

L&IT 401 Language and International Trade Practicum 1-3 Foreign language experience such as an approved study abroad program which provides the student with the opportunity to apply theoretical classroom learning to a foreign language experience in an appropriate setting. To be taken Pass/Fail only. *Prq:* FR 316 or GER 316 or SPAN 316 and six credits in language.

L&IT 402 Language and International Trade Directed Study 3 Directed study of an individual project in language and international trade. To be taken Pass/Fail only.

LATIN

Instructor: B. B. Lawson

LATIN 101 Elementary Latin 4(4,0) Course for beginners designed principally to teach the reading of the language.

LATIN 102 Elementary Latin 4(4,0) Continuation of LATIN 101.

LATIN 201 Intermediate Latin 3(3,0) Review of the fundamental principles of grammar in conjunction with readings from the Classical period. *Preq:* LATIN 102 or equivalent.

LATIN 202 Intermediate Latin 3(3,0) Continuation of LATIN 201 with the introduction of writings from the late Latin and Medieval periods. *Preq:* LATIN 201 or equivalent.

LEGAL STUDIES

Professors: A. H. Ringleb, T. B. Yandle; *Associate Professors:* D. J. Boudreaux, J. K. Cheezem, F. L. Edwards; *Lecturers:* W. H. Durham, J. R. Jahn, T. M. Patrick; *Adjunct Professor:* M. L. Thompson

LAW 312 Commercial Law 3(3,0) Introduction to business law with primary attention given to contracts, agency, and negotiable instruments. *Preq:* Junior standing.

LAW 313 Commercial Law 3(3,0) Continuation of LAW 312 with emphasis on business organizations, personal and real property, estates and bankruptcy, sales and secured transactions. *Preq:* LAW 312 or consent of instructor.

LAW 322, H322 Legal Environment of Business 3(3,0) Examination of both state and national regulation of business. Attention is given to the constitution and limitations of power, specific areas in which governments have acted, and the regulations that have been imposed in these areas. *Preq:* Junior standing.

LAW 333 Real Estate Law 3(3,0) The nature of real property and means of acquiring rights therein: conveyance of ownership, creation and execution of deeds, mortgages, etc., landlord and tenant relationships, shared concepts, and government regulation.

LAW 401 Labor Law 3(3,0) Basic labor law in the National Labor Relations Act, the Taft-Hartley and Landrum-Griffin Acts. Legal problems raised by state and federal statutes such as Workmen's Compensation, Wage and Hour Legislation, and Equal Opportunity laws. *Preq:* LAW 322, Junior standing.

LAW 402 Law and Economics 3(3,0) Application of economics to the law of property, torts, and contracts; regulation of markets, business organizations and financial transactions; and the distribution of income and wealth. *Preq:* ECON 211 and LAW 312 or consent of instructor.

LAW 405, 605 Construction Law 3(3,0) Provides a practical knowledge of legal principles applied to the construction process and legal problems likely to be encountered by the practicing construction professional. Topics include construction contracting, liability, claims and warranties, documentation, and responsibility and authority of contracting parties. *Preq:* LAW 312 or 322 or consent of instructor.

LAW 420 International Business Law 3(3,0) Intensive examination of the historical background of modern public and private international law; selected issues of public international law—human rights, law of war, United Nation's system, and international litigation; selected issues of private international law—international sales, international trade, and formation and operation of multinational businesses. *Preq:* LAW 312 or 322 or consent of instructor.

LAW 429, 629 Environmental Law and Policy 3(3,0) Review of legal issues involving environmental law and policy. Course covers the law regarding water, land, and air pollution, and other special laws such as Superfund and RCRA. The consequences of existing and alternative rules for environmental protection are subject to economic analysis. *Preq:* LAW 312 or 322 or consent of instructor.

LAW 499, 699 Selected Topics 1-3(1-3,0) In-depth examination of timely topics in legal studies. Course may be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Senior standing and consent of instructor.

LEISURE SKILLS

Professors: G. E. Howard, J. R. Pope, Jr.; *Assistant Professor:* M. H. Wynn; *Lecturer:* B. W. Stevens

L S 101 Challenge Recreation Activities 1(1,0) Course designed to encourage students to broaden their leisure skills and improve their self-images through challenge activities. Classroom instruction will stress how to get started safely in flying, scuba, canoeing, skiing, windsurfing, mountaineering, hang-gliding, ballooning, and other challenge activities.

L S 110 Bowling 1(0,3) Basic instructional program on techniques of bowling.

L S 120 Selected Topics 1(0,3) Provides an opportunity for presentation of leisure skills not covered in other courses. May be repeated for a maximum of three credits, but only if different topics are covered.

L S 130 Alpine Skiing 1(0,3) Basic downhill snow skiing instruction including equipment selection, safety, and maintenance; parallel turns; edging; carved and linked turns; wedging; and safety and etiquette. There is an additional fee for this course. Taught during Christmas recess. (Contact the Department of Parks, Recreation and Tourism Management in October.)

L S 140 Fencing 1(0,3) Individual and group instruction for beginners in the basic skills and techniques of foil fencing.

L S 150 Beginning Swimming 1(0,3) Fundamentals of swimming and water safety.

L S 151 Aquatic Sports and Diving 1(0,3) This course is designed to acquaint the student with various forms of aquatic sports; competitive swimming, diving and water polo.

L S 152 Sailing 1(0,3) Basic instruction in the nomenclature, safety and rescue techniques, and skills required to skipper sailing craft. *Preq:* Basic swimming skills.

L S 153 Beginning Canoeing 1(0,3) Basic instruction in the nomenclature, strokes, and safety techniques in canoeing. *Preq:* Basic swimming skills.

L S 154 Windsurfing 1(0,3) Basic windsurfing instruction including rigging, launching, tacking, jibbing, rig and foot steering, safety, maintenance, equipment selection, rules-of-the-road, and racing techniques are covered. Offered Fall Break and First Summer Session. There is an extra fee for this course. *Preq:* Ability to swim 300 yards and tread water for five minutes.

L S 155 Whitewater Kayaking 1(0,3) Student will learn flat-water and whitewater skills, techniques, safety, rescue, equipment selection and maintenance, and selection of routes/trips to participate in basic whitewater kayaking. *Preq:* Basic swimming skills.

L S 160 Beginning Tennis 1(0,3) Fundamentals course stressing rules, strokes and strategy, with ample opportunity for practice.

L S 162 Handball 1(0,3) Thorough knowledge and understanding of the rules, strategy, fundamental skills, and techniques of handball for the beginning player.

L S 163 Racquetball 1(0,3) Basic skills, knowledge of rules, and strategy, and basic strokes.

L S 170 Beginning Golf 1(0,3) Fundamental course stressing rules, strategy, and basic strokes.

L S 190 Modern Dance 1(0,3) Introduction to modern dance techniques with emphasis on developing the style of movement and understanding the dance art form.

L S 191 Aerobic Dance 1(0,3) Instruction in the development of skills for the safe improvement and maintenance of cardiovascular fitness, flexibility, and muscle tone utilizing dance movements and techniques.

L S 201 Sports Officiating 1(0,3) Practical study of officiating for various sports. The course will include studies and practical application of officiating rules and mechanics. Sports that will be studied include football, basketball, softball, soccer, and introductions to a variety of other team sports.

L S 230 Advanced Alpine Skiing 1(0,3) Advanced downhill snow skiing instruction in such techniques as mogul skiing, check turns, free-style and racing. There is an additional fee for this course. Taught during Christmas recess. (Contact the Department of Parks, Recreation and Tourism Management in October.) *Preq:* L S 130 or consent of instructor.

L S 254 Advanced Lifesaving 1(0,3) Course designed to enhance aquatic skills and to develop lifesaving techniques. It teaches progressive techniques and practice of lifesaving and water safety skills. *Preq:* Pass preliminary swim test.

L S 255 Water Safety Instruction 1(1,0) Course teaches progressive techniques and practice of teaching swimming and lifesaving. *Preq:* L S 254.

L S 260 Intermediate-Advanced Tennis 1(0,3) Opportunity to advance and correct mistakes in basic tennis skills. *Preq:* Basic tennis skills.

L S 263 Intermediate Racquetball 1(0,3) Course stressing advanced skills, techniques, and strategy with ample opportunity for practice and competition. Conditioning drills and safety aspects will also be covered. *Preq:* L S 163 or consent of instructor.

MANAGEMENT

Professors: J. K. Butler, Jr., R. S. Cantrell, M. D. Crino, J. S. Davis, D. W. Grigsby, *Chair:* W. H. Hendrix, J. J. Kanet, R. L. LaForge, T. L. Leap, M. A. McKnew; *Associate Professors:* R. L. Clarke, J. W. Patterson, P. L. Roth, C. H. St. John, V. Sridharan, T. P. Summers, D. M. Swanson; *Assistant Professors:* N. Balakrishnan, J. O. Fiet, L. D. Fredendall, A. Lipp, J. L. Miller, R. W. Pouder, T. L. Robbins; *Lecturers:* C. S. Ellis, T. B. Huneycutt, A. W. Wheeler, M. H. Williams

MGT 100 Management Orientation 1(1,0) Introduces the Management Department and Management degree programs to new students. Provides an overview of program content and the skills and capabilities expected of students as they progress through the program.

MGT 299 Computer Utilization 1(1,0) Familiarization with the use of mainframe computers for statistical analysis and access to internet facilities. *Preq:* CP SC 120 and MTHSC 301.

MGT 301, H301 Principles of Management 3(3,0) Management's role as a factor of economic production. Functions of management, principles of organization, and behavior in organizations.

MGT 305 Economics of Transportation 3(3,0) Formerly MGT 405. Topics covered include history and structure of transportation systems in the United States, the nature of transportation costs and rates, transportation systems as factors in industrial location, transportation policy and transportation's role in national security. *Preq:* Junior or Senior standing.

MGT (ECON) 306 Managerial Economics 3(3,0) See ECON 306.

MGT 307, H307 Personnel Management 3(3,0) Principles, concepts, and techniques concerned with effective and efficient utilization of personnel. Emphasis on motivation, leadership, and human behavior as they relate to employer-employee relations. Topics include personnel recruitment, classification, selection, training, development, and performance evaluation. *Preq:* Junior standing.

MGT 315 New Venture Creation 3(3,0) This course introduces students to entrepreneurship as an alternative career strategy. It examines the transformation of original business ideas into viable enterprises through the use of competitive wedges. It specifically treats the legal and regulatory requirements for business formation.

MGT 317 Logistics Management 3(3,0) Formerly MGT 417. Management of physical distribution and supply systems with emphasis on design concepts, cost determinants and control. *Preq:* Junior or Senior standing.

MGT 390 Operations Management 3(3,0) Examines the role of operations management in both manufacturing and service organizations. Discusses the concepts, tools, and techniques for managing the operations function. Topics include operations strategy, design, planning and control. *Preq:* MTHSC 301 or equivalent.

MGT 399, H399 Management Applications of Microcomputers 3(3,0) Three aspects of microcomputer applications are addressed: (1) analysis of the business potential of microcomputer applications, (2) use of microcomputers to reinforce material

from other management courses, and (3) the microcomputer as a professional support device. *Preq:* ACCT 202, MTHSC 301, or consent of instructor.

MGT 400 Management of Organizational Behavior 3(3,0) Purpose of this course is to provide the management student with a framework for understanding how behavior within business organizations is managed. Particular emphasis will be placed on integrating management theory with recent developments in the behavioral sciences with distinct management applications. Theory, research, and business applications will be considered. *Preq:* MGT 301 or 307.

MGT 402, H402, 602 Operations Planning and Control 3(3,0) Managing, planning, and controlling production and service operations with emphasis on demand forecasting, aggregate planning, production scheduling and inventory management. *Preq:* MA SC 310 and 312, MGT 390.

MGT 403 Special Problems 1-3(1-3,0) Planning, developing, and executing a research project related to the field of management or defense studies. *Preq:* Senior standing in Industrial Management or Management and consent of instructor.

MGT 404 Advanced Statistical Quality Control 3(3,0) Statistical quality control techniques as applied to all areas of quality control: process control, process capability, acceptance sampling, and economic aspects of quality decisions. *Preq:* MA SC 310 and MGT 390.

MGT 406, 606 Location Economics 3(3,0) Theoretical study of the general factors which determine industrial location in a market place economy. Current literature is surveyed. A comparison of location theory and actual location patterns is stressed. *Preq:* Senior standing or consent of instructor.

MGT 408, 608 Design of Production Systems 3(3,0) Examines the design of systems for production and delivery of goods and services. Emphasizes the impact of alternative designs on the competitive posture of the firm. Discusses the concepts, tools, and techniques for designing facilities and jobs and systems for continuous performance improvement. *Preq:* MA SC 310, 312 and MGT 390.

MGT 415, H415, 615 Business Strategy 3(3,0) Capstone course for seniors. Various methods are used in analyzing complex business problems, requiring students to integrate their knowledge of all areas of business. Student participation and written and oral communications are stressed. *Preq:* Senior standing or consent of instructor.

MGT 416, 616 Management of Human Resources 3(3,0) Recent developments in the management of human resources with emphasis on results of research into the motivation, development of potential, and full utilization of the human resources. *Preq:* MGT 307 and 400 or consent of instructor.

MGT 418, 618 Management Information Systems 3(3,0) Use of data processing concepts as an aid in implementing managerial functions. Electronic data processing terminology, software, hardware, computer operations and techniques, systems analysis and the principles of management information systems design and implementation are emphasized. *Preq:* MGT 299 or 399 or consent of instructor.

MGT 419 Industry and the Environment 3(3,0) Discussion of current issues and policies involving the impact of industry on the environment and effects of current environmental regulations and attitudes on industrial operations. Included are topics in environmental management, pollution and control, hazardous waste, and environmental liability.

MGT 422 Small Business Management 3(3,0) Study of the management of the small independently owned and operated business. Emphasis will be placed upon analyzing new business opportunities, planning and establishing a growing concern, and managing the contemporary small business. Field experience in consulting with small businesses will enhance the student's understanding of the unique opportunities and problems of small business organizations. *Preq:* MKT 301 or consent of instructor.

MGT 423, 623 International Business Management 3(3,0) Survey of the theoretical and institutional complexities of international business operations. Topics include exporting, importing, foreign investment, multinational corporations, and the international payment system. *Preq:* Junior or Senior standing.

MGT 424, 624 International Transportation and Logistics 3(3,0) Examination and analysis of international transportation systems and their logistics support systems. Topics include ocean shipping, international air transportation, port management and EEC and Soviet-block transport systems. International transport legislation and policies are also analyzed. *Preq:* Senior standing or consent of instructor.

MGT 425, 625 Compensation Management 3(3,0) Examination of the compensation employees seek in exchange for their efforts and contributions. Topics include government and union influences; job content analysis, description, and evaluation; developing pay structures; measuring and paying for performance; employee benefits; administration of the compensation plan; executive, managerial, professional, and sales. *Preq:* MGT 307 or consent of instructor.

MGT 426 Industrial Traffic Management 3(3,0) Course surveys the responsibilities and functions of industrial traffic management in manufacturing and distribution. Emphasis is on the role of the industrial traffic manager in optimizing the logistics system of the firm (i.e., the materials management of its inbound supplies and the distribution of its finished products). *Preq:* MGT 305 or 317.

MGT 430 Senior Seminar in Management 3(3,0) Involves an in-depth study of current business topics and allows senior management students the opportunity to relate their academic studies to real-world problems. A senior paper will be required. *Preq:* Senior standing.

MGT 431 Employee Diversity, Rights, and Responsibilities 3(3,0) Focuses on employee and organizational rights and responsibilities. Topics to be covered will include various types of discrimination (race, sex, religious, national origin, age, and disability status); drug and alcohol testing; AIDS in the workplace; employee discipline and termination issues; privacy and safety concerns; and union organizing campaigns.

MGT 435 Personnel Interviewing 3(3,0) Course is designed to help students understand current interviewing theory, conduct an employment interview, and advise their future employers how to improve interviewing programs. Topics will include job analysis, legal issues, types of interviews, and evaluating applicants. *Preq:* Permission of instructor.

MGT 444 International Perspectives in Industrial Management 3-6(3-6,0) Provides an international perspective to industrial management via organized plant visitations to businesses in a foreign country and lectures by, and discussions with, senior operations manager(s). Cultural visits and lectures will also be organized to provide a holistic perspective to cover cultural and economic environment of the host country. Students are responsible for travel costs. May be taken for a maximum of six credits. *Preq:* Permission of instructor.

MGT 490 Selected Topics in Industrial Management 3(3,0) In-depth examination of advanced topics in Industrial Management. Topics may vary in keeping with developments in the management profession and interests of faculty. Emphasis will be on the application of these topics to the production and operations management environment. *Preq:* MGT 402 or 404 or 408.

MANAGEMENT SCIENCE

Professors: R. S. Cantrell, M. A. McKnew; *Associate Professor:* J. W. Patterson; *Assistant Professors:* N. Balakrishnan, J. L. Miller; *Instructor:* C. S. Ellis

MA SC 310, H310 Introduction to Management Science 3(3,0) Quantitative methods of the management scientist with applications to business and industrial problems. Topics include regression analysis, correlation analysis, analysis of variance, sampling, and nonparametric methods. *Preq:* MTHSC 301 or equivalent.

MA SC 312, H312 Decision Models for Management 3(3,0) Exploration of the ways in which management science decision models can help in making sound managerial decisions. Topics include decision models and decision making, deterministic modeling, probabilistic modeling, and simulation. May not be taken by students who have passed MA SC 413. *Preq:* MTHSC 301 or equivalent.

MA SC 413 Management Science I 3(3,0) Role and use of management science techniques in decision making in business and industry. Stochastic and deterministic models will be emphasized. Topics include linear programming, queuing, Markov chains, and simulation. May not be taken by students who have passed MA SC 312. *Preq:* Consent of instructor.

MA SC 414 Statistical Analysis 3(3,0) Application of statistics in management decision making. Emphasis is placed on the proper design, analysis and interpretation of planned experiments. Topics include single factor through fractional factorial experiments. *Preq:* MA SC 310 or equivalent.

MARKETING

Professors: R. M. Reese, *Chair*; G. L. Waddle; *Associate Professors:* L. Carlson, C. R. Duke, R. Gomes, S. J. Grove, M. C. LaForge, G. M. Pickett; *Assistant Professors:* M. J. Dorsch, P. A. Knowles, D. A. McBane

MKT 301 Principles of Marketing 3(3,0) Principles and concepts involved in planning, pricing, promoting, and distributing of goods and services. *Preq:* Minimum of 45 hours completed or consent of instructor.

MKT 302 Consumer Behavior 3(3,0) Examination of selected individual and group behavioral science concepts and their application to the understanding of consumer decision making. *Preq:* MKT 301.

MKT 420 Professional Selling 3(3,0) Current theories about the selling of goods and services to organizational buyers in the context of long-term relationships. Role playing, video-taped presentations, and other techniques are generally employed to enhance interpersonal communication skills. *Preq:* Junior standing.

MKT 422 Entrepreneurship 3(3,0) Translation of the theories of marketing into practical ideas and techniques that promote successful marketing practices in small business. *Preq:* MKT 301 or consent of instructor.

MKT 423 Promotional Strategy 3(3,0) Emphasis on promotion as the communication function of marketing. Attention given to communication theory and promotion's relation to mass and interpersonal communication. Factors affecting the promotional decision-making process are explored, and promotion as a competitive tool is examined. *Preq:* MKT 301 or consent of instructor.

MKT 424 Sales Management 3(3,0) A comprehensive examination of the planning, implementation, and control of professional sales organizations. *Preq:* MKT 301 or consent of instructor.

MKT 425 Retail Management 3(3,0) Retailing is studied from a decision-making approach. Topics covered include target market analysis, location analysis merchandising, human resources, pricing, and promotion. *Preq:* ACCT 202 and MKT 301; or consent of instructor.

MKT 426 Business-to-Business Marketing 3(3,0) Study and analysis of the unique aspects of marketing goods and services to organizational buyers rather than household consumers. Emphasis is placed upon developing strategic responses to market opportunities given competitive behavior. *Preq:* MKT 301 or consent of instructor.

MKT 427, 627 International Marketing 3(3,0) Study of marketing from the international point of view. Emphasis will be placed upon the necessary modification of marketing thinking and practice for foreign markets due to individual environmental differences. *Preq:* MKT 301.

MKT 428 Services Marketing 3(3,0) Exploration and study of the nature of service organizations and the principles which guide the marketing of their products. Emphasis will be placed upon a marketing mix that is fundamentally different than that found in traditional goods marketing. *Preq:* MKT 301 or consent of instructor.

MKT 429, 629 Public and Nonprofit Marketing 3(3,0) Examines the role and application of marketing in public and nonprofit settings. Focuses on a conceptual understanding of the marketing discipline and marketing processes and shows how basic concepts and principles of marketing are applicable to public and nonprofit organizations. *Preq:* MKT 301 or consent of instructor.

MKT 430, 630 Marketing Product Management 3(3,0) Management of the firm's product or service offerings. Topics include new product screening, evaluation and development; product line and mix analysis, abandonment decisions, brand manager's role, new product development department, and others. Emphasis on decision making. *Preq:* MKT 301 and MA SC 310; or consent of instructor.

MKT 431, 631 Marketing Research 3(3,0) Research used in marketing decision making. Primary emphasis on methods and techniques used in planning, collection, processing and utilization of information. Topics include research design, sources of information, questionnaire design, sampling, data collection and data analysis. *Preq:* MKT 301, MTHSC 301, and MA SC 310; or consent of instructor.

MKT 438, 638 Technical Marketing 3(3,0) Integration of theories and research from business marketing, personal selling, and product management as applied to the marketing of advanced technology products and services. Original investigation of assigned projects, and in-depth case studies will be emphasized. *Preq:* MKT 301, 426, and three additional hours of marketing courses; or consent of instructor.

MKT 450 Strategic Marketing Management 3(3,0) Application of marketing constructs in the analysis and solution of marketing problems. Emphasis is placed on information systems, data analysis, and critical-thinking skills in solving marketing problems in a wide range of managerial decision areas including, but not limited to, new product development, pricing, advertising, personal selling, channels and international marketing. *Preq:* MKT 301 and 6 hours of 400-level marketing courses.

MKT 495, 695 Selected Topics 3(3,0) In-depth examination of timely topics in marketing. May be repeated for credit as topics vary. *Preq:* MKT 301 or consent of instructor.

MKT 499 Independent Study 1-3(1-3,0) Directed readings or independent research in selected marketing areas. Topics must be selected and proposed by student. Proposals must be approved by instructor. May be repeated for a maximum of three credits. *Preq:* MKT 301, 302 and consent of instructor.

MATHEMATICAL SCIENCES

Professors: J. V. Brawley, Jr., F. M. Cholewinski, P. M. Dearing, R. E. Fennell, *Chair*; W. R. Hare, Jr., R. E. Haymond, P. T. Holmes, R. E. Jamison, J. P. Jarvis, C. D. Jeffries, J. D. Key, M. M. Kostreva, R. C. Laskar, D. R. LaTorre, R. F. Ling, J. K. Luedeman, W. F. Moss III, P. R. Nelson, T. G. Proctor, J. A. Reneke, W. H. Ruckle, D. R. Shier, D. D. Warner; *Associate Professors:* W. P. Adams, J. R. Brannan, A. S. Cover, C. C. Cox, V. J. Ervin, P. G. Kiessler, K. B. Kulasekera, J. K. Peterson, C. B.

Russell, M. J. Saltzman, H. F. Senter, F. E. Sullivan, M. M. Wieck, C. L. Williams, *Assistant Professors*: J. C. Autuore, M. A. Coffin, J. Duan, I. B. Fetta, S. Gao, J. G. LaTorre, B. A. Novick, H. Zhang-Sun; *Lecturers*: S. S. Biggers, P. F. Garner, T. W. Long, M. Rios-Adams, K. J. Rothenmel, D. M. Simms; *Visiting Assistant Professors*: A. K. Bose, J. C. Harden, J. B. Lassiter, J. H. Nicholson, D. G. Rogers, C. J. Wypasek

MTHSC 101 Introduction to Probability 3(3,0)
Introductory study of randomness and probability. Major topics include descriptive techniques for data, basic probability concepts, permutations and combinations, discrete distributions, normal and uniform distributions, sampling distributions and the central limit theorem. *Preq*: A satisfactory score on the Mathematics Test, Level II (Standard) or consent of instructor.

MTHSC 102 Introduction to Mathematical Analysis 3(3,0) An intuitive approach to the concepts and applications of calculus. Topics include functions and graphing, differentiation, and integration. Applications from social, biological, and management sciences are presented. Not open to those receiving credit for MTHSC 106. *Preq*: A satisfactory score on the Mathematics Test, Level II (Standard) or consent of instructor.

MTHSC 104 College Algebra 3(3,1) Basic course in college algebra designed to prepare students for more advanced courses in finite probability, mathematical analysis, and elementary statistics. Fundamental concepts of algebra, algebraic equations and inequalities, functions and graphs will be studied. Students who have received credit for MTHSC 102 or 105 or 106 will not be allowed to enroll in or receive credit for MTHSC 104.

MTHSC 105 Precalculus 5(5,1) Extensive treatment of topics chosen to prepare students for the study of calculus. Special emphasis is given to polynomial, rational, exponential, logarithmic and trigonometric functions and their graphs, as well as basic and analytic trigonometry. Students who have received credit for MTHSC 102 or 104 or 106 will not be allowed to enroll in or receive credit for MTHSC 105.

MTHSC 106, H106 Calculus of One Variable I 4(4,0) Topics include analytic geometry, introduction to derivatives, computation and application of derivatives, integrals, exponential and logarithm functions. *Preq*: MTHSC 105, or a satisfactory score on the Mathematics Test, Level II (Standard) or consent of instructor.

MTHSC 108, H108 Calculus of One Variable II 4(4,0) Topics include infinite series, limits, differentiation and techniques of integration. *Preq*: MTHSC 106.

MTHSC 109 Algebra and Trigonometry for Teachers 3(3,0) Unified course in algebra and trigonometry. Complex number system, functions, graphs, solving equations and inequalities, trigonometry, sequences, series, combinations, and permutations. A refresher course for teachers assigned to teach in a school's college preparatory program. Enrollment limited to in-service teachers.

MTHSC 110 Analytic Geometry for Teachers 3(3,0) Algebraic techniques applied to geometry; lines, conic sections and their graphs; transforma-

tions of coordinates; general second-degree equations; parametric equations; polar coordinates. Restricted to in-service teachers. *Preq*: MTHSC 109 or equivalent.

MTHSC 115 Contemporary Mathematics for Elementary School Teachers I 3(3,0) Logic, sets, and the properties of the counting numbers, numeration systems. Open to Elementary Education majors only. *Preq*: A satisfactory score on the Mathematics Test, Level II.

MTHSC 116 Contemporary Mathematics for Elementary School Teachers II 3(3,0) Continuation of MTHSC 115. Subtraction, properties of the integers, elementary number theory, rational number system, real number system. Open to Elementary Education majors only. *Preq*: MTHSC 115 or consent of instructor.

MTHSC 119 Introduction to Discrete Methods 3(3,0) Topics normally will include elementary logic and methods of proof; sets, functions, and relations; graphs and trees; combinatorial circuits and Boolean Algebra. *Preq*: Satisfactory score on the Mathematics Test, Level II (Standard).

MTHSC 129 Problem Solving in Discrete Mathematics 3(2,2) A problem-solving approach to learning mathematics will be applied to topics in modern discrete mathematics. Typical selection of topics will include logic and proof, sets, relations, functions, mathematical induction, graphs and trees, counting techniques, recurrence equations. For Bachelor of Science and Bachelor of Arts majors in Mathematical Sciences only. Credit may not be received for both MTHSC 119 and 129. *Preq*: MTHSC 106.

MTHSC 203 Elementary Statistical Inference 3(3,0) Survey course in fundamental statistical principles with applications. Topics include estimation, tests of hypotheses, simple linear regression and correlation, analysis of count data, and nonparametric statistics. May not be taken for credit by students who have passed MTHSC 301, 302, or EX ST 301. *Preq*: MTHSC 101.

MTHSC 206, H206 Calculus of Several Variables 4(4,0) Topics include real valued functions of several variables, multiple integration, differential calculus of functions of several variables, vector field theory. *Preq*: MTHSC 108.

MTHSC 207 Multivariable Calculus 3(3,0) Introduction to the calculus of several variables, differential calculus and optimization of several variables, multiple integrals. Topics from the management sciences will be used to illustrate the above concepts. May not be taken by students who have passed MTHSC 206. *Preq*: MTHSC 102, or 106 with consent of instructor.

MTHSC 208, H208 Introduction to Ordinary Differential Equations 4(4,0) Introduction to the study of differential equations and their application to physical problems. Topics include exact, series, and numerical solutions; solutions by means of Laplace transforms; and solutions of systems of differential equations. *Preq*: MTHSC 206.

MTHSC 210 Applied Matrix Algebra 3(3,0) Introduction to the basic principles of matrix algebra with applications to the behavioral and managerial sciences. The major areas of application will include linear programming, directed graphs, and game theory. *Preq*: MTHSC 101 and 102 or 106.

MTHSC 216 Geometry for Elementary School Teachers 3(3,0) An informal treatment of the basic concepts of geometry. Open to Elementary Education majors only. *Preq*: MTHSC 116 or consent of instructor.

MTHSC 231 Mathematics of Life Insurance 3(3,0) Introduction to the basic mathematics of finance and life insurance. Topics include compound interest, annuities certain, mortality tables, life annuities, net premiums, net level reserves, modified reserves, nonforfeiture values and dividends.

MTHSC 232 Actuarial Science Seminar I 1(1,0) Problem-solving seminar designed to prepare the student for the Society of Actuaries Examination I (General Mathematics). *Preq*: MTHSC 206.

MTHSC 250 Introduction to Mathematical Sciences 1(1,0) Lectures and discussions on the mathematical sciences disciplines: Applied Mathematics, Computing Science, Core Mathematics, Management Science, Operations Research, and Statistics. *Preq*: MTHSC 106.

MTHSC 301, H301 Statistical Theory and Methods I 3(3,0) Principal topics include elementary probability theory, discrete and continuous random variables, expected values, normal distribution, chi-square distribution, t-distribution, F-distribution, tests of hypotheses, point and interval estimation, curve fitting. *Preq*: MTHSC 106 or 207 or 210.

MTHSC 302 Statistics for Science and Engineering 3(3,0) Methodology for collecting, organizing and interpreting data. Topics include understanding variability, graphical and numerical summarization of data, introductory probability, normal and related distributions, statistical inference, experimental design, simple linear regression. Statistical microcomputer software will be used. *Preq*: MTHSC 206.

MTHSC 308 College Geometry 3(3,0) Theorems and concepts more advanced than those of high school geometry. A treatment of the various properties of the triangle, including the notable points, lines, and circles associated with it. *Preq*: MTHSC 106.

MTHSC 311, H311 Linear Algebra 3(3,0) Introduction to the algebra of matrices, vector spaces, polynomials, and linear transformations. *Preq*: MTHSC 108 or consent of instructor.

MTHSC 360 Intermediate Mathematical Computing 3(3,0) Continuing study of mathematical computing using the FORTRAN language. Emphasis on subroutine computation with applications to problems in science and engineering. *Preq*: CP SC 110 or consent of instructor.

MTHSC 400, H400, 600 Theory of Probability 3(3,0) Principal topics include combinatorial theory, probability axioms, random variables, expected values; special discrete and continuous distributions, jointly distributed random variables, correlation, conditional expectation, law of large numbers, central limit theorem. *Preq*: MTHSC 206 or consent of instructor.

MTHSC 401, H401, 601 Statistical Methodology 3(3,0) Probability-based treatment of statistical methods. Topics include point and interval estimation, hypothesis testing, analysis of variance, regression and correlation, analysis of categorical data, and distribution-free procedures. *Preq*: MTHSC 311 and 400.

MTHSC 403, H403, 603 Introduction to Statistical Theory 3(3,0) Principal topics include sampling distributions, point and interval estimation, maximum likelihood estimators, method of moments, least squares estimators, tests of hypotheses, likelihood ratio methods, regression and correlation analysis, introduction to analysis of variance. *Preq:* MTHSC 400 or equivalent.

MTHSC 405, 605 Statistical Theory and Methods II 3(3,0) Principal topics include simple linear regression, multiple regression and correlation analysis, one-way analysis of variance, multiple comparison, multifactor analysis of variance, experimental design. Computation and interpretation of results are facilitated through use of statistical computer packages. *Preq:* MTHSC 301.

MTHSC 406, 606 Sampling Theory and Methods 3(3,0) Probability-based treatment of sampling methodology. Theory and application of estimation techniques will be treated using simple and stratified random sampling, cluster sampling, and systematic sampling. *Coreq:* MTHSC 401.

MTHSC 407, 607 Regression and Time-Series Analysis 3(3,0) Theory and application of the regression and time series. Approaches to empirical model building and data analysis are treated. Computation and interpretation of results are facilitated through the use of interactive statistical packages. *Preq:* MTHSC 401.

MTHSC 408, 608 Topics in Geometry 3(3,0) Introduction to topics in special geometries which include non-Euclidean space concepts such as projective geometry, finite geometries, and intuitive elementary topology. A brief introduction to vector geometry. *Preq:* MTHSC 206.

MTHSC 410 Number Theory 3(3,0) Introduction to the theory of integers and related number systems. Topics include historical development, principle of mathematical induction, divisibility, primes, congruences, number-theoretic functions, primitive roots, quadratic residues, and diophantine equations. *Preq:* MTHSC 108 or consent of instructor.

MTHSC 412, H412, 612 Introduction to Modern Algebra 3(3,0) Introduction to the concepts of algebra. Topics included are the number system and the elementary theory of groups, rings, and fields. *Preq:* MTHSC 311.

MTHSC 419, H419, 619 Discrete Mathematical Structures I 3(3,0) This course applies theoretical concepts of sets, functions, binary relations, graphs, Boolean algebras, propositional logic, semigroups, groups, homomorphisms, and permutation groups to computer characteristics and design, words over a finite alphabet and concatenation, binary group codes, and other communication or computer problems. *Preq:* MTHSC 311.

MTHSC 425, H425 Orthogonal Functions and Boundary Value Problems 3(3,0) Continuation of MTHSC 208. Introduction to Fourier Series, numerical methods, partial differential equations, and certain special functions is given. *Preq:* MTHSC 208.

MTHSC 432 Actuarial Science Seminar II 1(1,0) Problem-solving seminar designed to prepare the student for the Society of Actuaries Examination 2 (probability and statistics). *Preq:* MTHSC 403 may be taken concurrently or consent of instructor.

MTHSC 434, 634 Advanced Engineering Mathematics 3(3,0) Fourier series, Laplace and Fourier transform and numerical methods for solving initial value and boundary-value problems in partial differential equations are developed. Applications to diffusion wave and Dirichlet problems are given. Matrix methods and special functions are utilized. *Preq:* MTHSC 208.

MTHSC 435, H435, 635 Complex Variables 3(3,0) Elementary functions. Differentiation and integration of analytic functions. Taylor and Laurent series. Contour integration and residue theory. Conformal mapping. Schwartz-Christoffel transformation. *Preq:* MTHSC 206.

MTHSC 440, H440, 640 Linear Programming 3(3,0) Introduction to linear programming covering the simplex algorithm, duality, sensitivity analysis, network models, formulation of models, and the use of simplex codes to solve, interpret, and analyze problems. *Preq:* MTHSC 206, 311, or consent of instructor.

MTHSC 441, H441, 641 Introduction to Stochastic Models 3(3,0) Introductory treatment of stochastic processes, finite-state Markov chains, queueing, dynamic programming, Markov decision processes, reliability, decision analysis and simulation. Both theory and applications will be stressed. *Preq:* MTHSC 400.

MTHSC 450 Introduction to Mathematical Models 3(3,0) Study of the modeling process which will include the translation of practical problems into mathematical models, the solution of the mathematical models, and the interpretation of the solution back into practical problems. Examples will be chosen from the physical, biological, social, and management sciences. *Preq:* CP SC 110, MTHSC 208. *Coreq:* MTHSC 401 or consent of instructor.

MTHSC 453, H453, 653 Advanced Calculus I 3(3,0) Limits, continuity, and differentiation of functions of one and several variables, the Riemann integral, and vector analysis. *Preq:* MTHSC 206.

MTHSC 454, H454, 654 Advanced Calculus II 3(3,0) Continuation of MTHSC 453. Transformations, multiple integrals, line and surface integrals, infinite sequences and series, and improper integrals.

MTHSC 460, 660 Introduction to Numerical Analysis I 3(3,0) Introduction to the problems of numerical analysis emphasizing computational procedures and application. Topics include sources of error and conditioning, matrix methods, systems of linear equations, nonlinear equations, interpolation and approximation by splines, polynomials, and trigonometric functions. *Preq:* MTHSC 206 or 207 or 360 or equivalent.

MTHSC 463, H463, 663 Mathematical Analysis I 3(3,0) Basic properties of the real number system, sequences and limits; continuous functions, uniform continuity and convergence. Integration, differentiation, functions of several real variables, implicit function theory. *Preq:* MTHSC 206.

MTHSC 464, H464, 664 Mathematical Analysis II 3(3,0) Continuation of MTHSC 463.

MTHSC 481 Seminar in Mathematics 1(1-3,0) Attention will be focused upon mathematical areas in which nonroutine problems can be posed with comparative ease. Emphasis will be upon independent study and student use of previously acquired mathematical skills. Open to students only by invitation for not more than three hours credit.

¹Credit toward graduation will be given for only one of the following: EX ST 301, MTHSC 301, 302.

MECHANICAL ENGINEERING

Professors: D. E. Beasley, S. B. Biggers, E. H. Bishop, M. W. Dixon, R. S. Figliola, Chair; J. L. Gaddis, J. G. Goree, I. Haque, C. O. Huey, Jr., R. J. Kopyczek, E. H. Law, J. A. Liburdy, F. W. Paul, C. E. K. Przemiński, H. J. Rack, T. Wang; *Associate Professors:* G. M. Fadel, M. Grujicic, J. M. Kennedy, J. H. Lyle, D. A. Zumbrennen; *Assistant Professors:* S. Ahzi, J. C. Bokar, W. Chen, C. R. Deckard, P. F. Joseph, J. M. Ochterbeck, C. D. Rahn, L. L. Thompson; *Lecturers:* L. P. Golan, J. B. Riester, C. K. Roby; *Visiting Assistant Professors:* A. Kaadan, J. K. Kapat, L. Tran, I. V. Viktorova; *Adjunct Professor:* P. M. Taylor

M E 201 Foundations of Engineering Design 3(3,0) The design process will be introduced, including methods to stimulate creativity and innovation. Further, basic physical components of engineering systems will be introduced in the context of their use in engineering design. Also included are considerations of design documentation, patents, professional ethics and nontechnical, nonanalytical constraints in design. *Preq:* ENGR 180, PHYS 122 and Mechanical Engineering major.

M E 202 Foundations of Mechanical Systems 3(3,0) Introduces students to the basic physical elements of mechanical engineering systems. Problems solving, design, and resourceful application of mathematics and general principles from the students' science courses are emphasized throughout. *Preq:* MTHSC 108, PHYS 122, E M 201 (or concurrent enrollment).

M E 203 Foundations of Thermal and Fluid Systems 3(3,0) Introduction to control volumes, conservation laws of mass, momentum, and energy. Concepts of work and heat are introduced, including rate forms. Properties of pure substances. *Preq:* MTHSC 206, PHYS 221.

M E 204 Manufacturing Processes for Engineering Materials I 3(3,0) Course deals with the processing science for metallic and other materials of interest to mechanical engineers. Emphasis is placed upon the interrelations between the structure, processing, and properties of materials. *Preq:* CH 102, E M 201, M E 201 (or concurrent enrollment), MTHSC 108, PHYS 122, and Mechanical Engineering major.

M E 205 Computer Analysis in Engineering 2(2,0) [C.1] Application of undergraduate mathematics and basic engineering principles with an emphasis on numerical methods and the use of mathematical software packages in the solution of engineering problems. Problems are drawn from dynamics, vibrations, kinematics, thermodynamics, heat transfer, materials engineering, fluid mechanics, and other engineering fields. *Preq:* ENGR 120, MTHSC 206 (or concurrent enrollment), PHYS 122 and Mechanical Engineering major.

M E 208 Numerical Methods in Engineering 3(3,0) Application of undergraduate mathematics and basic engineering principles, with an emphasis on numerical methods in the solution of engineering problems. Problems will be drawn from dynamics, vibrations, kinematics, thermodynamics, heat transfer, fluid mechanics, electrical circuits, and other engineering fields. *Preq:* MTHSC 208 or concurrent enrollment.

M E 221 Mechanical Engineering Laboratory I 1(0,3) Discovery of mechanical engineering principles and phenomena. Introduction to laboratory safety practices, instrumentation, calibration techniques, data analysis, and report writing. *Preq:* ME 202 (or concurrent enrollment), 203 (or concurrent enrollment), PHYS 221.

M E H300 Junior Honors Seminar 0 Designed to acquaint students enrolled in the Departmental Honors Program with current research activities in the Department of Mechanical Engineering. The faculty will provide seminars where research interests are summarized. These seminars are planned to prepare students in choosing a research topic for the senior thesis. *Preq:* Departmental Honors student with Junior standing.

M E 301 Materials for Mechanical Engineering Applications 3(3,0) Course deals with the properties and selection of materials of interest to mechanical engineers. Emphasis is placed upon the interrelations between the microstructure, processing and properties of materials. *Preq:* CH 102, E M 304 (or concurrent enrollment), and M E 304 (or concurrent enrollment).

M E 302 Mechanical Systems and Vibrations 3(3,0) Techniques for developing physical and mathematical models of mechanical systems are presented with the vibratory behavior of these systems being stressed. The system response is determined using classical mathematical analysis methods, simulation, Laplace transforms, and matrix methods. *Preq:* E M 202, M E 208, MTHSC 208.

M E 303 Thermodynamics 3(3,0) Study of the second law and entropy. Applications to fixed mass systems and control volumes. Vapor and gas power cycles. Mixtures of gases. Vapor psychrometrics. Combustion and the third law. Thermochemical equilibrium. *Preq:* M E 203.

M E 304 Heat Transfer 3(3,0) Heat conduction in the steady and transient states, free and forced convection, radiation, combined modes. Analytical and numerical solutions to engineering heat transfer problems are emphasized. *Preq:* E M 320 and M E 311.

M E 305 Modeling and Analysis of Dynamic Systems 3(3,0) Techniques for developing and analyzing physical and mathematical models of mechanical and electromechanical systems are presented. Transient and frequency response are determined using analytical and numerical methods. Basic feedback systems are introduced. *Preq:* E C E 307, M E 202, 205, MTHSC 208.

M E 306 Fundamentals of Machine Design 3(3,0) Introduction to failure theory, fatigue analysis, and energy methods for deflection analysis. Integration of these topics with selected portions of mechanics of materials and application of them to the design and analysis of machine elements. *Preq:* E M 304.

M E 310 Thermodynamics and Heat Transfer 3(3,0) Introduction to thermodynamics and heat transfer for nonmajors: properties of liquids and gases, first and second law analysis, introduction to cycles for power and refrigeration, heat flow by conduction and radiation, and convective heat flow and heat exchangers. *Preq:* Junior standing in an Engineering curriculum.

M E 311 Engineering Thermodynamics I 3(3,0) First and second laws of thermodynamics applied to engineering systems. Properties of the ideal and real gases and vapors. Processes and introduction to power and refrigeration cycles. *Preq:* MTHSC 206, PHYS 221.

M E 312 Engineering Thermodynamics II 3(3,0) Continuation of M E 311. Gas power cycles, thermodynamic relations, compressibility charts, mixtures and psychrometrics, combustion, and introduction to equilibrium. *Preq:* M E 311.

M E 313 Instrumentation and Measurements 3(2,3) Principles of measurements, instrument accuracy, and performance characteristics. Modern instrumentation for measuring both static and dynamic pressure, temperature, fluid flow, speed, power, force, acceleration, etc. Uncertainty analysis, curve fitting, and technical report writing. Data acquisition computer methods for engineering experimentation. *Preq:* E C E 307, M E 302, and all required 200-level engineering mechanics and mechanical engineering courses completed.

M E 322 Mechanical Engineering Laboratory II 2(1,3) Mechanical engineering principles and phenomena will be reinforced through student conducted experiments. Presentation of fundamentals of instrumentation, calibration techniques, data analysis, and report writing in the context of laboratory experiments. *Preq:* E M 304 (or concurrent enrollment), 320 (or concurrent enrollment), M E 303 (or concurrent enrollment), M E 221, MTHSC 208.

M E 323 Mechanical Engineering Lab III 2(1,3) Continuation of M E 322. Mechanical engineering principles and phenomena will be reinforced through student conducted experiments. Presentation of fundamentals of instrumentation, calibration techniques, data analysis, and report writing in the context of laboratory experiments. *Preq:* M E 301 (or concurrent enrollment), 304 (or concurrent enrollment), 305 (or concurrent enrollment), 306 (or concurrent enrollment), M E 322, MTHSC 302 or EX ST 411.

M E 400 Senior Seminar 1(1,0) Seminars address the problems to be encountered by engineering graduates in professional practice. Invited lecturers as well as faculty provide the lectures and demonstrations. *Preq:* All required 300-level engineering mechanics and mechanical engineering courses completed.

M E 401 Mechanical Engineering Design 3(3,0) [W.2] Project oriented course in mechanical engineering. Emphasis is placed on the role of analysis, synthesis, and evaluation in design and on written reporting of design solutions. The influence of economics and optimization, concurrent development, integration of design and manufacturing, and system creation are utilized for engineering design decisions. *Preq:* All required 300-level E C E, E M, and M E courses; M E 404 (or concurrent enrollment).

M E 402 Internship in Engineering Design 3(1,6) [W.1] Creative application of general engineering knowledge in solving an open-ended design problem provided by a sponsor typically external to the University. Progress is evaluated by a faculty jury. Students present results to the jury and sponsor through written reports and oral presentations addressing University written/oral competency goals. *Preq:* All required 300-level E C E, E M, and M E courses.

M E 403 Manufacturing Processes for Engineering Materials II 3(2,3) This course deals primarily with the processing and manufacturing of products from metals, polymers, and composites of interest to mechanical engineers. Emphasis is placed upon the analytical aspects of processing. *Preq:* M E 204, 304, 312, 313.

M E 404 Manufacturing Processes and Their Application 3(3,0) Fundamental principles associated with production processes and their application to the manufacture of products from metals, polymers, ceramics, and composites. The course emphasizes the physical and quantitative aspects of processing, the selection of processes to create products, and the identification of processes used to manufacture existing products. *Preq:* All required 300-level E M and M E courses, or approval of the instructor.

M E 405 Kinematics and Dynamics of Machinery I 3(3,0) Graphical, analytical, and numerical techniques are used in the dynamic analysis and synthesis of machines. Emphasis on the application of these analysis techniques to planar linkages. *Preq:* E M 202, 304, M E 208.

M E 407, 607 Applied Heat Transfer 3(3,0) Application oriented extension of M E 304, considering topics in transient conduction, flow of fluids, energy exchange by radiation, and mass transfer. Applications in heat-exchanger design with emphasis on economics and variation of operating conditions from the design point. *Preq:* M E 304 and consent of instructor.

ME 409 Design of Thermal/Fluid Systems 3(3,0) A project-oriented design course in the areas of fluid mechanics, heat transfer, and thermodynamics. *Preq:* M E 304, 312, and E M 320.

M E 413 Thermal Systems Laboratory 1(0,3) Experimental investigations in the thermal/fluid science areas of heat transfer, fluid mechanics, and thermodynamics. Experiments include heat exchangers, drag, standard fan tests, and others. *Preq:* M E 304, 312, 313.

M E 414 Mechanical Systems Laboratory 1(0,3) Investigations of natural phenomena arising within the areas of vibrations, control, machine dynamics, and machine design. Experiments include vibrations, frequency response, closed-loop control, fatigue, machine behavior, and others. *Preq:* M E 306, 313, 405 (or concurrent enrollment), 416 (or concurrent enrollment).

M E 415, H415 Undergraduate Research 1-3 Individual research projects to be conducted under the direct supervision and guidance of a faculty member. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

M E 416 Control of Mechanical Systems 3(3,0)

Physical modeling and feedback principles are presented for control of mechanical systems. Transient response, root locus and frequency response principles are applied to the control of basic mechanical systems such as electric motors, fluid tanks, or thermal processes. PID control laws are emphasized. *Preq:* M E 302, 313.

M E 417, 617 Control Systems Design 3(2,1) Analytical, simulation, and experimental methods are applied to control system design. Fundamentals of linear state variable and computer-control systems are introduced. Laboratory emphasis is placed on control-systems performance measurement, and control-system implementation including sensors and actuators. *Preq:* M E 416 or consent of instructor.

M E 418 Finite Element Analysis in Mechanical Engineering Design 3(2,3) Introduction to the finite element method. Introduction to solid modeling, finite element modeling and analysis using commercial codes. Analysis strategies using finite elements. Applications to heat transfer, fluid flow and structures. *Preq:* E M 304, 320 and M E 208, 304, or consent of instructor.

M E 420, 620 Energy Sources and Their Utilization 3(3,0) Covers the availability and use of energy sources such as fossil fuels, solar (direct and indirect) and nuclear. Addresses energy density and constraints to use (technical and economic) for each source. *Preq:* M E 312.

M E 421, 621 Introduction to Compressible Flow 3(3,0) Introductory concepts to compressible flow. Methods of treating one-dimensional gas dynamics including flow in nozzles and diffusers, normal shocks, moving and oblique shocks, Prandtl-Meyer Flow, Fanno Flow, Rayleigh Flow, and reaction propulsion systems. *Preq:* E M 320, M E 311.

M E 422, 622 Design of Gas Turbines 3(3,0) Guiding principles in gas turbine cycles are reviewed. Turbine and compressor design procedures and performance prediction for both axial and radial flow machines are presented. Methods of design of rotary heat-exchangers and retrofitting gas turbine for regenerative operation are presented. Design projects are used to illustrate the procedures. *Preq:* E M 320.

M E 423, 623 Introduction to Aerodynamics 3(3,0) Basic theories of aerodynamics are presented with the purpose of accurately predicting the aerodynamic forces and moments which act on a vehicle in flight. *Preq:* E M 320, and all 300-level engineering mechanics and mechanical engineering courses completed.

M E 424 Mechanical Engineering Laboratory IV 1(0,3) Continuation of M E 323. Mechanical engineering principles and phenomena will be reinforced through open-ended, student designed and conducted experiments. Utilization of mature skills in measurement techniques, data analysis, and report writing. *Preq:* All required 300-level E C E, E M, and M E courses, M E 404 (or concurrent enrollment).

M E 425, 625 Kinematics and Dynamics of Machinery II 3(3,0) Graphical, analytical, and numerical techniques are used in the dynamic analysis and synthesis of machines. Emphasis on the application of the analysis techniques to cams, gears, and other mechanisms. *Preq:* M E 405.

M E 429, 629 Thermal Environmental Control 3(3,0) Mechanical vapor compression refrigeration cycles, refrigerants, thermoelectrical cooling systems, cryogenics, thermodynamic properties of air, psychrometric charts, heating and cooling coils, solar radiation, heating and cooling loads, insulation systems. *Preq:* M E 304, 312.

M E 431 Applied Fluids Engineering 3(3,0) Applications-oriented course in industrial fluids engineering, primarily directed toward the analysis and design of piping systems and components for liquid and gas flow. Topics include friction factors, head loss, flow capacities, piping networks, flow measurement, pumps, control valves, and hydraulic and pneumatic components. *Preq:* E M 320, M E 313.

M E 440 Materials for Aggressive Environments 3(3,0) Emphasizes the engineering aspects of selecting materials for applications in aggressive environments. Various types of materials degradation are discussed as are methods for waste prevention, including especially engineering design and materials selection approaches. Structural metallic alloys are emphasized; however, technically important ceramics and polymers are also discussed. *Preq:* M E 204 and 306.

M E 453, 653 Dynamic Performance of Vehicles 3(3,0) Introduces techniques for analyzing the dynamic behavior of vehicles. Types of vehicles to be considered will be chosen from aircraft, surface ships, automobiles and trucks, railway vehicles, and magnetically levitated vehicles. *Preq:* M E 208, 302 or consent of instructor.

M E 454, 654 Design of Machine Elements 3(3,0) Design of common machine elements including clutches, brakes, bearings, springs, and gears. Optimization techniques and numerical methods are employed as appropriate. *Preq:* M E 306 or consent of instructor.

M E 455, 655 Design for Computer-Automated Manufacturing 3(3,0) Concepts of product and process design for automated manufacturing are considered. Topics include product design for automated manufacturing, inspection and assembly, using automation, industrial robots, knowledge-based systems and concepts of flexible product manufacture. *Preq:* M E 204, 306, and 403 (or concurrent enrollment); or consent of instructor.

M E (E C E) 456, 656 Design and Application of Industrial Robots 3(3,0) Considers the mechanics and control of industrial robots and their application to manufacturing problems. Topics covered include robot geometry, kinematics, and dynamics; servomechanisms, control and process application; programming; and integration into manufacturing applications. *Preq:* M E 204, 306, and 403 (or concurrent enrollment); or consent of instructor.

M E 493, 693 Selected Topics in Mechanical Engineering 1-6 (1-6,0) Study of topics not found in other courses. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

MEDICAL TECHNOLOGY

Coordinator: M. V. Ruppert

McLeod Regional Medical Center (Florence)

Adjunct Associate Professor: V. Hyman; *Adjunct*

Assistant Professor: V. T. Anderson

M T 101 Introduction to Medical Technology 1(1,0) Introduction to the operation and practices in a medical laboratory. This course is designed to integrate the academic year with the clinical year. Included will be lectures on current laboratory practices, a visit to a modern medical laboratory, current training of laboratory personnel and seminars on areas of specialization.

MT 401 Immunology 3(2,4) Presents the principles of serology and immunology and the tests utilizing these principles to detect abnormalities helpful in the diagnosis of disease. *Preq:* Senior standing in Medical Technology and enrollment in a clinical program.

M T 402 Clinical Microbiology 8(4,11) Principles of microbiology: bacteriology, mycology, virology, and parasitology. Emphasis is placed on human pathogenic organisms, using both fresh and prepared organisms. *Preq:* Senior standing in Medical Technology and enrollment in a clinical program.

M T 403 Hematology and Hemostasis 5(3,7) Information on blood as a tissue, the theory of hematological and hemostasis (coagulation) tests, factors that affect test reliability. Knowledge of blood dyscrasias. Skill in the performance of hematology and hemostasis tests is emphasized and the use of automation techniques is covered. *Preq:* Senior standing in Medical Technology and enrollment in a clinical program.

MT 404 Blood Bank 4(2,6) History and principles of blood-group systems and methods of cross matching. Selection, pretesting, and bleeding of donors and processing of blood for transfusions, including component therapy. *Preq:* Senior standing in Medical Technology and enrollment in a clinical program.

M T 407 Urinalysis 2(1,3) Study of renal function together with principles of urine analysis and anatomy of the urinary system. Emphasis is placed on laboratory procedures and their utilization to detect abnormalities helpful in the diagnosis of disease. *Preq:* Senior standing in Medical Technology and enrollment in a clinical program.

M T 408 Clinical Chemistry 10(6,14) Chemical principles as applied to the analysis of biochemical substances and to physiological processes of clinical importance. Emphasis is placed on the chemistry of blood and urine. Advanced laboratory instruments, statistical analysis, and quality control concepts are covered. *Preq:* Senior standing in Medical Technology and enrollment in a clinical program.

M T 491 Special Topics in Medical Technology 2(1,4) Some or all of the following topics will be covered during the clinical experience: cell physiology, educational principles, laboratory management, scientific reports, research problems, etc. The manner in which the accredited hospital administers the special topics will vary somewhat due to the institutional differences. *Preq:* Senior standing in Medical Technology and enrollment in a clinical program.

MT 495 Medical Technology Clinical Studies 0-17 General enrollment course for students in hospital phase. Specific medical technology credits awarded at end of clinical year. *Preq:* Senior standing in Medical Technology.

MICROBIOLOGY

Professors: S. F. Barefoot, J. D. Gangemi, S. S. Hayasaka, *Chair:* T. A. Hughes, E. L. Kline, L. L. Larcom, J. W. Lawson, Jr., M. J. B. Paynter, T. E. Schwedler, F. J. Stutzenberger

MICRO 100 Microbes and Human Affairs 1(1,0) An explanation of the roles of microorganisms in today's world and the significance of microbes to the future of mankind.

MICRO 205 Introductory Microbiology 4(3,3) Basic concepts of microbiology are introduced through classroom and laboratory experiences. Emphasis is on practical applications in various areas of importance to man. Recommended for students not majoring in a biological science. Not open to Microbiology majors. *Preq:* CH 101 and 102, BIOL 103.

MICRO 305, 605 General Microbiology 4(3,3) Morphology, physiology, classification, distribution, and cultivation of microorganisms. *Preq:* Introductory biology, CH 101, 102, or 112.

MICRO 400, 600 Public Health Microbiology 3(3,0) Epidemiology of transmissible diseases including pathogenic characteristics of the infectious organism, modes of transmission, mechanism of infection, diagnostic aids, effective treatments, immunizing procedures and methods of preventing infection. *Preq:* MICRO 305.

MICRO 401, H401, 601 Advanced Bacteriology 4(2,6) Metabolism, nutrition, growth, and death of bacteria; microbiological assays and industrial fermentation; emphasis on laboratory procedures for the identification of the more common taxonomic groups. *Preq:* CH 201 or 223, 227, MICRO 305.

MICRO 403, 603 Marine Microbiology 3(2,3) Discussion of the microbes that inhabit the marine environment, their peculiar physiological traits, and contributions to the ecology of oceans. *Preq:* MICRO 305, Organic Chemistry.

MICRO 407, H407, 607 Food and Dairy Microbiology 4(3,3) Physical-chemical factors limiting survival and growth of microorganisms during processing and manufacturing of food and dairy products. Standard methods for enumerating and identifying indicator bacteria, yeasts, molds and microbes producing food and foodborne illness. Starter cultures, fungal toxins, microbial cell injury and standards for food and dairy products. *Preq:* BIOCH 210 or CH 201 or 223, MICRO 305.

MICRO 410, H410, 610 Soil Microbiology 3(2,3) Role of microorganisms in the decomposition of organic substances, transformation of nitrogen and mineral substances in the soil; interrelationships between higher plants and microorganisms; importance of microorganisms in soil fertility. *Preq:* MICRO 305.

MICRO 411, H411, 611 Pathogenic Bacteriology 4(3,3) Study of pathogenic bacteria, their morphology, cultural requirements and classification; diagnostic tests, methods of differentiation, and the diseases caused. *Preq:* MICRO 305.

MICRO 412, H412, 612 Bacterial Physiology 4(3,3) Consideration of the cytology, physiology, metabolism, and genetics of bacteria. Included will be studies of growth and death, reproduction and mutation, nutrition and metabolic pathways, regulatory mechanisms, and effects of environment. *Preq:* CH 224, MICRO 305, one semester of biochemistry, or consent of instructor.

MICRO 413, H413, 613 Industrial Microbiology 3(2,3) Microbial aspects of large-scale processes for the production of foods, antibiotics, enzymes, fine chemicals, and beverages. Topics include strain selection, culture maintenance, biosynthetic pathways, continuous cultivation and production of single cell protein. *Preq:* MICRO 305.

MICRO 414, H414, 614 Basic Immunology 3(2,3) Consideration of the nature, production, and function of basic immune responses in animals. Procedures and mechanisms of antigen-antibody and other immune reactions. *Preq:* MICRO 305, Organic Chemistry.

MICRO 415, H415, 615 Microbial Genetics 4(3,3) Cytological basis of bacterial, fungal, and viral genetics; molecular aspects; mutations; mechanisms of genetic transfers; episomes and plasmids; and population changes. *Preq:* BIOCH 301, CH 224, MICRO 305, or consent of instructor.

MICRO 416, H416, 616 Introductory Virology 3(3,0) General introduction to the field of virology, including animal, bacterial, and plant viruses. Topics will include nomenclature and classification, biochemical and biophysical characteristics, mechanisms of replication, chemotherapy, and techniques for isolation, assay and purification. *Preq:* BIOCH 301, MICRO 305, or consent of instructor.

MICRO 417, H417, 617 Molecular Mechanisms of Carcinogenesis and Aging 3(3,0) Changes which occur at the cellular and subcellular levels during transformation and aging. Accumulated damage and "intrinsic clock" theories of aging; genetic and epigenetic theories of carcinogenesis; epidemiology of cancer; viral, radiation-induced and chemical carcinogenesis; the immune system and cancer. *Preq:* BIOCH 301, MICRO 305, or consent of instructor.

MICRO 418, 618 (BIOSC, GEN) Biotechnology I: Nucleic Acids Techniques 4(2,4) See BIOSC 418.

MICRO 491 Special Problems in Microbiology 1-3(0,3-9) Research problems in the various areas of microbiology designed to introduce undergraduate students to the planning and execution of research experimentation, and the presentation of research findings.

MILITARY SCIENCE

Professor: H. W. Millar, *Chair; Assistant Professors:* S. F. Dunham, J. J. Gallagher III, W. K. Isaacs, B. McIntosh

M S 101 Military Science (Basic) 1(1,2) This course examines the role of the Army in today's society, ranks and branches of the Army, principles and techniques of leadership. Laboratory periods provide training in physical conditioning, mountaineering, and weapons safety and firing. One hour lecture per week; two-hour laboratory every other week or equivalent.

M S 102 Military Science (Basic) 1(1,2) Study of Army organization and doctrine with additional focus on pay and allowances, other forces, the non-commissioned officer, and fundamentals of first aid. Laboratory periods provide training in mountaineering, weapons safety and firing, and land navigation.

M S 201 Military Science (Basic) 1(1,2) Introductory study of U.S. Military Weapons Systems. Emphasis is on the historical and practical perspectives of current U.S. Army weaponry. Leadership laboratory provides the students practical experience in applying principles learned and experience in leadership and physical fitness.

M S 202 Military Science (Basic) II 1(1,2) Introduction to principles of warfare and introduction to military land navigation. Leadership laboratory provides the students practical experience in applying the principles learned in class, in addition to experience in leadership and physical training.

M S 301 Military Science (Advanced) 1(1,1) Small unit tactics: analysis of the leader's role in directing and coordinating small units in the execution of offensive and defensive tactical missions. Cadets will participate in leadership laboratory training throughout the school year.

M S 302 Military Science (Advanced) 2(2,1) Organizational leadership and methods of instruction. Study of relevant theories and concepts of organizational leadership and human behavior; techniques used in planning and presenting instruction. Continuation of leadership laboratory.

M S 401 Military Science (Advanced) 1(1,1) Study of military operations, with emphasis on small unit leadership, training, and administration. Subject matter and leadership laboratories are designed to provide requisite knowledge and experience for commissioning and initial military assignment.

M S 402 Military Science (Advanced) 2(2,1) Continuation of M S 401, with emphasis on military justice, law of warfare, and ethics. Subject matter and leadership laboratories are designed to provide requisite knowledge and experience for commissioning and initial military assignment.

MUSIC

Professors: B. F. Cook, E. A. Freeman, R. E. Goodstein, L. U. Harder; *Associate Professors:* L. Hochheimer, D. R. Rash; *Assistant Professors:* N. M. Hosler, A. R. Levin; *Visiting Instructor:* V. L. Hamilton

MUSIC 151 Applied Music 1(0,1) Individual study in performance medium (piano, voice, strings, woodwinds, brass, percussion). One thirty-minute private lesson each week, for which a minimum of four hours practice is required. May be repeated for credit with departmental approval of differing performance media. Applied music fee will be assessed. *Preq:* Consent of instructor, based upon a qualifying audition.

MUSIC 152 Applied Music 1(0,1) Continuation of MUSIC 151. Applied music fee will be assessed. *Preq:* MUSIC 151.

MUSIC 205 Music Theory 3(3,0) Terminology and notation of traditional music are reviewed, and the techniques of sight-singing and melodic dictation are practiced. Harmonic practices are studied, relating to the principal diatonic triads in all inversions. *Preq:* Consent of instructor, based on musical literacy.

MUSIC 206 Music Theory 3(3,0) Continuation of MUSIC 205 with emphasis on diatonic triads and seventh chords in all inversions, nonchord tones and basic elements of musical form. Practice in sight singing, melodic dictation, and harmonic dictation is included. *Preq:* MUSIC 205.

MUSIC 210, H210 Music Appreciation: Music in the Western World 3(3,0) Designed to deepen the student's appreciation of his/her musical heritage through a study of the elements of the musical language and its development in Western culture.

MUSIC 251 Applied Music 1(0,1) Continuation of MUSIC 152. Applied music fee will be assessed. *Preq:* MUSIC 152 and consent of instructor.

MUSIC 252 Applied Music 1(0,1) Continuation of MUSIC 251. Applied music fee will be assessed. *Preq:* MUSIC 251 and consent of instructor.

MUSIC 305 Music Theory: Advanced Harmony 3(3,0) Study of harmonic usage involving chromaticism, free dissonance and atonality. Harmonic dictation is practiced. *Preq:* MUSIC 206.

MUSIC 306 Music Theory: Form Analysis 3(3,0) Principles of formal construction in music of all periods are studied by the inductive analysis of representative works. *Preq:* MUSIC 206.

MUSIC 311 Music Appreciation: American Music 3(3,0) Music in America from 1620 to the present. Indigenous and borrowed influences will be examined.

MUSIC 312 Introduction to Jazz 3(3,0) Comprehensive survey of jazz elements and styles. A historical perspective from Dixieland to bebop to jazz/rock is included.

MUSIC 313 History of Rock and Roll 3(3,0) Comprehensive survey of rock elements, styles, and artists. Emphasis will be placed on the evolution of rock and roll including a broad examination of musical influences. Course content will examine how rock and roll both reflected and influenced social issues.

MUSIC 315 Music History 3(3,0) Development of Western music from antiquity to 1750, emphasizing representative literature from various styles and periods.

MUSIC 316 Music History 3(3,0) Continuation of MUSIC 315. Music from 1750 to the present.

MUSIC 321 Principles of Piano Performance I 3(3,0) An in-depth study of the principles of piano performance focusing on how to interpret a musical score, develop technical skills and practice techniques, and use the body correctly at the keyboard. *Preq:* By audition.

MUSIC 322 Principles of Piano Performance II 3(3,0) Continuation of MUSIC 321. *Preq:* MUSIC 321 or consent of instructor.

MUSIC 351 Applied Music 1(0,1) Continuation of MUSIC 252. Student is required to perform an appropriate solo in a student recital. Applied music fee will be assessed. *Preq:* MUSIC 252 and consent of instructor.

MUSIC 352 Applied Music 1(0,1) Continuation of MUSIC 351. Student is required to perform an appropriate solo in a student recital. Applied music fee will be assessed. *Preq:* MUSIC 351 and consent of instructor.

MUSIC 361 Marching Band 1(0,3)¹ Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time. May be repeated for credit with a maximum of eight hours of ensemble credit allowable toward a degree. Fall semester only. *Preq:* Consent of director.

MUSIC 362 Symphonic Band 1(0,3)¹ Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time. May be repeated for credit with a maximum of eight hours of ensemble credit allowable toward a degree. *Preq:* Consent of director.

MUSIC 363 Jazz Ensemble 1(0,3)¹ Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time. May be repeated for credit with a maximum of eight hours of ensemble credit allowable toward a degree. *Preq:* Consent of director.

MUSIC 364 Concert Band 1(0,2)¹ Devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time. May be repeated for credit with a maximum of eight credits of ensemble allowable toward a degree. *Preq:* Consent of director.

MUSIC 365 University Chorus 1(0,3)¹ Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time. May be repeated for credit with a maximum of eight hours of ensemble credit allowable toward a degree. *Preq:* Consent of director.

MUSIC 366 Vocal Jazz Ensemble 1(0,3)¹ Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time. May be repeated for credit with a maximum of eight hours of ensemble credit allowable toward a degree. *Preq:* Consent of director.

MUSIC 367 Chamber Singers 1(0,3)¹ Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time. May be repeated for credit, with a maximum of eight hours of ensemble credit allowable toward a degree. *Preq:* Consent of director.

MUSIC 368 Small Ensemble 1(0,3)¹ Ensembles: devoted to the musical training of instrumental, vocal ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time. May be repeated for credit with a maximum of eight hours of ensemble credit allowable toward a degree. *Preq:* Consent of director.

MUSIC 369 Symphony Orchestra 1(0,3)¹ Mid-sized, college-community orchestra devoted to performing works from the standard repertoire. Weekly evening rehearsals with one or more performances per semester. May be repeated for credit with a maximum of eight hours of ensemble credit allowable toward a degree. *Preq:* Consent of director.

MUSIC 398 Special Topics in Music 3(3,0) Consideration of select areas of study in music not addressed by other music course offerings. May be repeated once for credit. *Preq:* Consent of instructor.

MUSIC 400 Music in the Elementary Classroom 3(3,0) Designed to give the teacher in the elementary classroom a familiarity with traditional, Kodaly, Orff, and Kindermusik approaches in correlating music with language arts, mathematics, and social studies.

MUSIC 404 MIDI Applications 3(3,0) Exploration of MIDI (Musical Instrument Digital Interface) through music notation and sequencing. Students will have hands-on experience producing printed scores and sequences on the computer and selected software. *Preq:* MUSIC 205 or consent of instructor.

MUSIC 451 Applied Music 1(0,1) Continuation of MUSIC 352 for exceptional students, guiding the student in interpretation of advanced solo and ensemble literature. A minimum of eight hours weekly practice is required. Student is also required to perform an appropriate solo in a student recital. Applied music fee will be assessed. *Preq:* MUSIC 352 and consent of instructor.

MUSIC 452 Applied Music 1(0,1) Continuation of MUSIC 451. Student is required to present a recital. Applied music fee will be assessed. *Preq:* MUSIC 451 and consent of instructor.

MUSIC 499 Independent Studies 1-3(1-3,0) Tutorial work for students with special interests in music study outside the scope of existing courses. *Preq:* Consent of department chair.

¹No more than a total of eight semester hours earned in this group of courses may be used in meeting degree requirements: MUSIC 361, 362, 363, 364, 365, 366, 367, 368, 369.

NURSING

Professors: O. S. Hipps, R. B. Hughes, E. J. Lee, B. N. Logan, Director; E. J. Murrow, S. M. Oldaker; *Associate Professors:* P. M. Kline, F. M. Oglesby, N. K. Meehan, A. B. Privette, R. H. Pruitt, M. B. Reichenbach, P. A. Smart, S. W. Thompson; *Assistant Professors:* D. A. Bechtel, C. L. Belcher, R. A. Spadoni, J. L. Timms, D. F. Willoughby; *Instructor:* J. S. Gillespie; *Lecturers:* P. A. Botchway, K. M. Brown, R. L. Carr, W. J. Cloer, R. F. Collins, C. H. Craig, L. M. Gibson, K. P. Hardin, E. N. Hatfield, E. R. Hearn, D. L. Irvine, E. F. Macfie, C. B. Mega, M. S. Reimer, G. A. Rochester, S. D. Smith, W. K. Wolfe

NURS 140 Computer Applications in Health Care 3(3,0) Designed to introduce students to the application of computers in the delivery of health care. The course will cover existing health-care applications and forecast future needs. Multiple computer systems will be discussed. Nursing majors will be given enrollment priority.

NURS 210 Health Assessment 3(2,3) Course introduces the concepts of health, wellness, and illness. Focus is on physical and psychosocial as-

assessment for the well adult client with variations across the lifespan. Interviewing techniques are included. Practice of skills is provided in the laboratory sessions. Open only to Nursing majors.

NURS 211 Therapeutic Nursing Interventions 4(2,6) Focus on therapeutic nursing interventions, including selected psychomotor skills, communication skills and teaching/learning. Open only to Nursing majors. *Preq:* Sophomore standing.

NURS 230 Professionalism in Nursing 3(3,0) Analysis of the historical development of modern nursing. Consideration of nurses' professional roles, utilization of critical thinking, nursing process, nursing theory, and cultural sensitivity in relation to health-care delivery systems. Open only to Nursing majors.

NURS 240 Pharmacotherapeutic Nursing Interventions 3(3,0) Focus is on integration of nursing process with pharmacotherapeutics, administration, monitoring, and related client education. Includes major drug classifications, indications for use, side effects, interactions, routes of administration, usual dosages and contraindications. Open only to Nursing majors. *Preq:* Sophomore standing.

NURS 300 Seminar in Health Care Topics 1-4 (1-4,0-9) Designed to provide individualized in-depth study in a selected health-care area. May have a clinical component and/or special projects. Open to non-Nursing majors. May be taken more than once for a maximum of six credits. *Preq:* Consent of instructor.

NURS 301, H301 Nursing Care of the Childbearing Family 4(2,6) Course focuses on health care of the childbearing family. Emphasis is placed on biological, psychological, and sociocultural concepts specific to the childbearing client throughout the childbearing process. *Preq:* NURS 211, 230, PSYCH 340. *Coreq:* NURS 304.

NURS 302, H302 Nursing Care of Children 4(2,6) A course which focuses on health problems of infants, children, and adolescents. Emphasis is placed on biological, pathophysiological, psychological, and sociocultural concepts related to nursing care of children with acute and chronic illnesses in hospital settings. Strategies for alleviation of illness, restoration of wellness and promotion and maintenance of normal growth and development of children are presented. *Preq:* NURS 216, 230, PSYCH 340. *Coreq:* NURS 304.

NURS 303 Nursing of Adults 7(3,12) Application of the nursing process in providing care to adults and/or families in the hospital setting. Emphasizes biological, psychological, and sociocultural influences on health problems. Alterations in cellular dynamics, respiration, circulation, musculo-skeletal, neurological, elimination and perioperative care are included. Pharmacotherapeutics, nutrition, client education and discharge planning are discussed. *Preq:* BIOSC 223, NURS 211, 230. *Coreq:* NURS 304.

NURS 304 Pathophysiology for Health-Care Professionals 3(3,0) Focus is on disease mechanisms and recognition of the manifestations of these mechanisms in body systems. The discussion will also include pharmacologic and mechanical interventions commonly associated with specific disease processes and application to patient-care situations. *Preq:* BIOSC 223, consent of instructor.

NURS 305 Psychosocial Nursing 3(3,0) Examination of psychosocial factors affecting the individual and the family with a physical illness or health problems; the use of the nursing process to employ interpersonal communication strategies to assist the patient and the family to alter behaviors to achieve a higher quality of health and life. *Preq:* NURS 210 and 211.

NURS 315, H315 The Developing Family in the Community 4(3,3) Focus on childbearing clients, infants, children, and adolescents. Major emphasis on ways in which these individuals may achieve or maintain wellness in the family, home, and community environment. Identification of appropriate nursing strategy that will enhance wellness in the community. *Preq:* BIOSC 223, NURS 211, 230, PSYCH 340.

NURS 316, H316 Adult Nursing in the Community 4(3,3) Focus on nursing care of adults in family and community settings. Nursing interventions are identified that enhance health in the adult and elderly client. Includes study of diverse life-style factors leading to increased or decreased well-being of the individual. *Preq:* BIOSC 223, NURS 211, 230, PSYCH 340, SOC 311.

NURS 330 Research in Nursing 2(2,0) Focus on an introduction to research in nursing. Analysis of reported research in nursing. Ethical, moral, and legal issues are discussed in relation to nursing research. *Preq:* NURS 230. *Preq/Coreq:* EX ST 301 or MTHSC 203.

NURS (PHIL) 350 Technology and Philosophy in Nursing 3(3,0) Analysis of the influence of the increasing application of scientific technology to health-care delivery and concomitant ethical issues.

NURS 401, H401 Mental Health Nursing 4(2,6) Explanations of factors contributing to the development of a psychiatric disorder including theories of development and behavior; the use of the nursing process, emphasizing the interpersonal use of self, in the care of the patient with an identified psychiatric disorder. *Preq:* All required 300-level nursing courses.

NURS 402, H402 Long-Term Nursing Care 3(1,6) Focus on concepts and issues basic to long-term care. *Preq:* All required 300-level nursing courses.

NURS 403, H403 Complex Nursing of Adults 6(4,6) Focus on the biological, psychological, philosophical, and sociocultural influences on complex health problems related to acute and traumatic conditions. Emphasis on the concepts of circulation, oxygenation, homeostasis, and compensation in acutely ill adults. *Preq:* All required 300-level nursing courses.

NURS 405 Leadership and Management in the Delivery of Nursing Care 4(3,3) Focus on the role of the professional nurse in enabling and managing the delivery of nursing care within organizations. Theories and research related to leadership, power, management, organization, regulation, and ethics are discussed. Directed laboratory experiences are provided. *Preq:* All required 300-level courses.

NURS 406 Issues in Professionalism 3(3,0) Analysis of the development of professional nursing. Consideration of educational issues, legal and economic issues, health policy, leadership, cultural variations and the influence of values in ethical

decisions and nursing practice. *Preq:* Admission to RN/BS program.

NURS 407 Family Nursing in the Community 5(4,3) Focus on wellness-promotion strategies and nursing care of childbearing clients, infants, children, adolescents, adults and older adults in family and community settings. Includes study of diverse lifestyle factors related to health and well-being of individuals. *Preq:* NURS 210, Admission to RN/BS program.

NURS 415, H415 Community Health Nursing 3(2,3) Consideration of health promotion activities for community and population groups with emphasis on community assessment, screening, planning and health, and teaching/counseling. Practice activities will be related to health promotion in population groups. Laboratory settings include areas such as industries, schools, clinics, and other community agencies and organizations. *Preq:* All required 300-level nursing courses.

NURS H426 Independent Study 4(2,6) Opportunity for in-depth study in an area of special interest in clinical nursing. Laboratory experience is arranged with the instructor. Specific objectives are to be developed by the student with the consent of the instructor under whom the student wishes to study. *Preq:* All 300-level nursing courses except NURS 300 and consent of instructor.

NURS 471, H471, 671 Holistic Approaches to Health 3(3,0) Introduction to holistic approaches to nursing in the health-care system. Ways in which these approaches can be utilized within existing systems of nursing-care delivery to augment technological approaches are explored. *Preq:* Required 300-level courses in nursing curricula or consent of instructor.

NURS 485 Nurse Extern Practicum 6(0,18) Practicum consisting of preceptor-supervised and faculty-led nursing clinical experiences in a regional health-care facility. *Preq:* Completion of at least one adult health and one pathophysiology course or consent of instructor.

NUTRITION

(See also courses listed under Animal, Dairy and Veterinary Sciences; Biochemistry; Food Science; and Poultry Science)

Professors: A. B. Bodine II, D. L. Cross, R. J. Davis, D. M. Henricks, L. W. Hudson, M. E. Kunkel, D. V. Maurice, J. C. McConnell, Jr., G. C. Skelley, Jr.; *Associate Professors:* E. H. Hoyle, T. C. Jenkins, D. D. Lee, Jr.; *Instructor:* E. C. Turner; *Visiting Professor:* W. P. Williams, Jr.

NUTR 201 Introduction to Nutrition 3(3,0) Principles of the nutrition of domestic animals and man include sources, digestion, absorption, utilization and functions of nutrients; effects of dietary deficiencies; and nutrients required for maintenance, growth, reproduction, lactation, work, and egg-shell quality. *Preq:* BIOCH 210, CH 223, or consent of instructor.

NUTR 203 Principles of Human Nutrition 3(3,0) Principles of nutrition including functions, digestion, and requirements of nutrients; factors affecting food choices and dietary adequacy; and roles of nutrition in physical fitness and health maintenance. May not be substituted for NUTR 401.

NUTR 401, H401, 601 Fundamentals of Nutrition 3(3,0) Biochemical and physiological fundamentals of nutrition applicable to domestic animals and man. Considered are digestive processes, and absorption and metabolism of carbohydrates, lipids, proteins, water, minerals and vitamins. Energy metabolism and comparative anatomy and physiology of digestive systems are discussed. *Prq:* BIOCH 210, CH 223, or consent of instructor.

NUTR 420 Selected Topics in Nutrition 1(3-1,3,0) Comprehensive study of special topics in nutrition not covered in detail or contained in other courses. Current developments in each topic area will be stressed. May be repeated for a maximum of three credits, but only if different topics are covered. *Prq:* Senior standing or consent of instructor.

NUTR 421 Special Problems in Nutrition 1-4(0,3-12) Independent research investigation in nutrition. Special emphasis will be placed on developing a research proposal, conducting the research, and reporting the findings. May be repeated for a maximum of six credits, but only if different topics are covered. *Prq:* Senior standing or consent of the instructor.

NUTR 425, H425, 625 Nutrition and Dietetics 4(3,3) Development of diets to meet human nutritional needs with emphasis on metabolic bases of dietary management of individuals with various disease states. *Prq:* NUTR 451 or equivalent.

NUTR 426, 626 Community Nutrition 3(3,0) Study of the fundamentals of nutrition care delivery in community programs beginning with assessment and problem identification and continuing through the development, implementation and evaluation of nutrition intervention programs. *Prq:* NUTR 451 or equivalent or consent of instructor.

NUTR 451, H451, 651 Human Nutrition 3(3,0) Essentials of nutrition and principle nutritional deficiency conditions. Factors affecting adequacy of dietary intake, methods of determining nutritional status, development of nutrition standards, and recent advances in human nutrition. *Prq:* BIOCH 210/211 or equivalent or consent of instructor.

NUTR 455, 655 Nutrition and Metabolism 3(3,0) Concepts of metabolism fundamental to understanding normal and therapeutic nutrition will be examined. Bioenergetics as well as metabolism of carbohydrates, lipids, amino acids, vitamins, and minerals as they relate to nutrition will be discussed. *Prq:* NUTR 451 and BIOCH 210 or 423 or 406 or consent of instructor.

PACKAGING SCIENCE

Associate Professors: R. F. Testin, *Chair*; P. J. Vergano; *Assistant Professor:* F. H. Barron; *Lecturer:* L. H. Doar, Jr.; *Adjunct Professors:* C. R. Barmore, D. E. Hudgin; *Adjunct Associate Professor:* D. H. Johns; *Adjunct Assistant Professor:* C. A. Bjorkengren; *Adjunct Instructor:* R. R. Perdue

PKGSC 101 Packaging Orientations 1(1,0) Overview of the various principles and practices in packaging science, historical development, packaging as a career.

PKGSC 102 Introduction to Packaging Science 2(2,0) The functions of a package; materials, processes and technology used in package develop-

ment; the relationship of packaging to the corporation, consumer, and society as a whole. *Prq:* PKGSC 101 or consent of instructor.

PKGSC 202 Packaging Materials and Manufacturing 3(3,0) Detailed study of packaging materials including glass, metal, metal foils and sheets, wood, paper, paperboard, plastics, composites, adhesives, coatings, cushioning media; their functional properties in packaging application; and laminating and combining of different packaging materials. *Prq:* PKGSC 102 or consent of instructor.

PKGSC 204 Container Systems (Rigid and Flexible) 3(3,0) Examination of all the packages and containers used to develop systems to distribute products. Compatibility of product and package, structural design, costs and merchandising considerations are stressed. *Prq:* PKGSC 202, 206 (or concurrent enrollment) or consent of instructor.

PKGSC 206 Container Systems Laboratory 1(0,3) Laboratory practice in sample making, designing and constructing various containers. *Prq:* PKGSC 204 or concurrent enrollment in PKGSC 204.

PKGSC 316 Application of Polymers in Packaging 3(2,3) Detailed study of polymer chemistry and polymerization technology. Emphasis will be on polymers which are significant in packaging. The study will include polymer morphology, rheology, physical properties and processing methods. *Prq:* PKGSC 204; CH 201 or 223; or consent of instructor.

PKGSC 368, H368 Packaging and Society 3(3,0) Study of the role of packaging in modern-day society. Responsibilities of the packager to protect people and the environment. Package guidelines recommended by civilian and governmental agencies. *Prq:* PKGSC 102 or consent of instructor.

PKGSC 401 Packaging Machinery 3(3,0) A systematic study of machinery used to form, fill, seal, laminate, combine and print continuous and automated packaging lines and auxiliary material handling equipment, including principles of machine design, operation, selection, and specification. *Prq:* PKGSC 204, PHYS 207 or consent of instructor.

PKGSC 404, H404 Mechanical Properties of Packages and Principles of Package Evaluation 3(3,0) Study of the mechanical properties of packages, principles and standard methods (ASTM, TAPPI) of determining these properties. Evaluation of functional properties of packages including shock and vibration isolation. *Prq:* PHYS 207, PKGSC 204, or consent of instructor.

PKGSC (FD SC) 409 Total Quality Management for the Food and Packaging Industries 3(3,0) See FD SC 409.

PKGSC 420 Package Design and Development 3(3,0) Relationship between packaging and the marketing of consumer goods. Study of the various principles and methods practiced in developing packages, methods used to coordinate package development activities including interfacing with product development, manufacturing, marketing, and purchasing. *Prq:* PHYS 207, PKGSC 404, or consent of instructor.

PKGSC 421 Special Problems in Packaging Science 1-4(0,3-12) Independent research investigations in packaging science related to packaging materials, machinery, design, and applications.

Special emphasis will be placed on organizing a research proposal, conducting research, and reporting results. May be repeated for a maximum of 15 credits. *Prq:* Consent of instructor.

PKGSC 422 Selected Topics in Packaging Science 1-3(1-3,0) Comprehensive study of selected topics in packaging science not covered in detail or contained in other courses. Contemporary development in each topic area will be stressed. May be repeated for a maximum of 15 credits, but only if different topics are covered. *Prq:* Consent of instructor.

PKGSC 440 Packaging for Distribution 3(3,0) The delivery of a packaged product from the point of manufacture to the point of sale often involves several shipping methods, e.g., truck, rail, air or ship. To assure both product protection and lowest cost, the student must be familiar with the fundamentals of distribution packaging technology. *Prq:* Senior status and permission of instructor.

PKGSC 454 Package Evaluation Laboratory 2(0,6) Laboratory experiments to determine properties or packaging materials and to evaluate the performance of packages including shipping tests (shock and vibration). Student learns how to operate standard testing apparatus and becomes familiar with industry-recognized test methods and standards. *Prq:* PKGSC 404 or consent of instructor.

PARKS, RECREATION AND TOURISM MANAGEMENT

Professors: L. R. Allen, *Chair*; R. H. Becker, G. W. Burnett, L. W. Gahan, W. E. Hammit, G. E. Howard, A. E. James, F. A. McGuire, R. W. McLellan, J. R. Pope, Jr.; *Associate Professors:* S. J. Backman, H. J. Grove, J. M. McDonald, M. K. McLellan, T. D. Potts, C. R. White, Jr.; *Assistant Professors:* W. C. Norman, M. E. Patterson, M. H. Wynn; *Lecturers:* B. W. Stevens, J. H. Stevens, Jr.

PRTM 101 Concepts of Leisure 3(3,0) Introduces recreation professions and organizations: government, voluntary, and commercial. Overviews professional preparation. Outlines development of man's uses of leisure and evolution of recreation, city parks, natural resources conservation and preservation movements as philosophical forces affecting leisure services.

PRTM 104 Recreation Services Delivery Systems 3(3,0) Students will be introduced to the major delivery systems of Parks, Recreation and Tourism Management. The philosophy, clientele, current issues, and career opportunities within these areas will be studied. Enrollment limited to Parks, Recreation and Tourism Management majors.

PRTM 201, H201 The Recreation/Leisure Environment 3(3,0) Discusses the development characteristics of built and natural environmental resource settings for recreation, tourism development, and community expression. Examines human/environment interactions during leisure, including both impacts of the recreation environment on people and people impacts on the recreation environment. Surveys public agencies and private interests in these settings.

PRTM 203 Personal and Community Health 3(3,0) Course deals with health problems, disease prevention and control, school health practices, public health administration, and other health information which may enable one to live intelligently in today's complex society.

PRTM 205 Program and Event Planning 3(2,3) Principles and methods of program development. Time and facility utilization for sports activities, social functions, arts and crafts, outdoor activities, hobbies or special-interest groups, and activities in the cultural and performing arts will be pursued. *Preq:* PRTM 101.

PRTM 206 Practicum I 1(0,3) Provides the opportunity for a student to conduct a recreation program in a supervised setting. A minimum of 90 hours with a leisure agency approved by the University is required. To be taken Pass/Fail only. *Preq:* PRTM 205, Sophomore standing in Parks, Recreation and Tourism Management.

PRTM 207 Practicum II 1(0,3) Continuation of PRTM 206. Experience will be gained in a leisure situation different from the PRTM 206 exposure. A minimum of 90 hours with a leisure agency and approved by the University is required. To be taken Pass/Fail only. *Preq:* PRTM 205, Sophomore standing in Parks, Recreation and Tourism Management.

PRTM (FOR) 209 Professional Application of Microcomputers 3(1,4) [C.3] Basic competencies in and professional applications of the following areas will be realized: GUI, word processing, databases, spreadsheets, graphics and electronic communication. Additionally, legal and ethical issues of computer use and information access and exchange will be presented. *Preq:* Majors in Parks, Recreation and Tourism Management or Forest Resources will be given priority at registration.

PRTM 254 Sports in Recreation 3(2,3) Administrative and supervisory skills indigenous to public and/or private agency athletic programs are considered. Group instruction is given to individual and team sports, and officiating techniques applicable to these sports are taught.

PRTM 270, H270 Introduction to Recreation Resources Management 3(3,0) Fundamentals of recreation resources management are presented to include the framework of management, management of specific resources, management of visitors, and management of services.

PRTM 301 Recreation and Society 3(3,0) The role of recreation in a technological and work-oriented society is investigated. Particular emphasis will be placed on recreation behavior, resources, and programming in public and private organizations which serve the public wants. Not open to Parks, Recreation and Tourism Management majors or students who are taking or have completed PRTM 101.

PRTM 305 Safety and Risk Management in Parks, Recreation and Tourism Management 3(3,0) Provisions of safe services, facilities and activities in the parks, recreation and tourism domain will be studied through the application of germane concepts from the areas of safety, risk management, and liability. *Preq:* PRTM 321. *Coreq:* Junior standing.

PRTM 307 Facility Operations and Maintenance 3(2,3) Maintenance techniques and materials. Job planning and scheduling problems of overuse and preventive maintenance are included.

PRTM 308, H308 Leadership and Group Processes in Recreation 3(3,0) Leadership is analyzed through experience-based learning. Various styles of leadership and communication and their probable consequences are examined. Techniques for planning of large and small group meetings are considered. Examination is made of literature in the field of leadership and group processes.

PRTM 309 Behavioral Concepts in Parks, Recreation and Tourism 3(3,0) Studies social psychological concepts concerning leisure behavior in various types of park, recreation, and tourism settings. Students will learn to apply those theories and behavioral concepts required to understand and manage leisure activities and environments. *Preq:* PRTM 101 or consent of instructor; SOC 201 or PSYCH 201.

PRTM 311, H311 Therapeutic Recreation 3(3,0) Examination of the profession of therapeutic recreation by analyzing the history, philosophy, concepts, roles, and functions involved in the therapeutic recreation services.

PRTM 314 Therapeutic Recreation Interventions I 1(0,3) Experiential examination of program interventions used with mental health, chemically dependent, and related populations. *Preq:* PRTM 101.

PRTM 315 Therapeutic Recreation Interventions II 1(0,3) Experiential examination of program interventions used with physically disabled and other populations. *Preq:* PRTM 314.

PRTM 316 Therapeutic Recreation Processes 3(3,0) Examination of principles and procedures applicable to client assessment, activity analysis, goal identification, treatment planning, documentation, and evaluation in therapeutic recreation. *Preq:* PRTM 311.

PRTM 318 Leisure Lifestyle Management 3(3,0) Course examines principles and techniques applicable to guiding disabled as well as nondisabled individuals in an exploration of leisure needs, barriers, consequences, and accessibility.

PRTM 320, H320 Recreation Policymaking 3(3,0) Structures and processes for public park and/or recreation policy formation in the United States.

PRTM 321, H321 Recreation Administration 3(3,0) An analysis of the internal organization of a recreation department dealing with finances and accounting, records and reports, publicity and public relations, state and federal legislation, staff organization, coordination of community resources. *Preq:* Junior standing.

PRTM 330, H330 Visitor Services and Interpretation 3(3,0) An introduction to the philosophy and principles of the art of environmental interpretation. A comprehensive survey of interpretive theory as it applies to the recreation and parks practitioner and the varying settings within the profession.

PRTM 342, H342 Introduction to Tourism 3(3,0) Survey of travel and tourism in the United States with focus on terminology, demographics, financial significance, and trends.

PRTM 343 Spatial Aspects of Tourist Behavior 3(3,0) Spatial patterns of national and international leisure travel destinations are explored and analyzed regarding their tourism attractiveness.

PRTM 344 Tourism Markets and Supply 3(3,0) Course will acquaint students with the principles of matching tourism markets and supply. Students will examine the strategies used in developing markets.

PRTM 349 Survey of Tourism Sites 1(0,3) On-site study of various exemplary components of the travel and tourism industry in the southeast. There will be additional costs to students to cover the travel portion of this course. To be taken Pass/Fail only. *Preq:* PRTM 342; Junior standing in Parks, Recreation and Tourism Management or consent of instructor.

PRTM 352 Camp Organization and Administration 3(2,3) Surveys the development and trends of camping in America. Considers programming for the operations of agency and private camps. Enables students to master the techniques of group living. Laboratory offers practical experience in camp craft including trips and outdoor cooking.

PRTM 390 Independent Study in Parks, Recreation and Tourism Management 1-3(1-3,0) Comprehensive studies and investigation of special topics not covered in other courses. Emphasis will be placed on field studies, community service and independent readings. May be repeated for a maximum of three credits. *Preq:* Junior standing and consent of instructor.

PRTM 391 Selected Topics in Parks, Recreation and Tourism Management 2-3(2-3,0) Presents an in-depth examination of developing trends in parks, recreation, and tourism that warrants timely study. May be repeated twice for a maximum of six credits, but only if different topics are covered. *Preq:* Junior standing in Parks, Recreation and Tourism Management.

PRTM 400, 600 Supervision of Recreation Personnel Patterns and Processes 3(3,0) A comprehensive study of the supervisory process in relation to individuals, programs, and groups in recreation agencies.

PRTM 403 Elements of Recreation and Park Planning 3(3,0) Basic recreation and park planning principles, processes and trends in area and facility development combine to form the basis for formulation of a relevant knowledge of planning. *Preq:* Senior standing.

PRTM 404 Field Training I 1(1,0) Preparation for field training experience including topics such as resume development, interviewing techniques, internship agency selections, and responsibilities of the student, department, and agency. To be taken Pass/Fail only. *Preq:* PRTM 206, 207 (or concurrent enrollment), or consent of instructor.

PRTM 405 Field Training II 7(0,21) Requires a minimum of ten weeks (at least 400 hours) of uninterrupted, supervised work within a park, recreation or tourism management agency. Under agency staff supervision, the student will observe, organize, and implement activities, events, and programs. To be taken Pass/Fail only. *Preq:* PRTM 206, 207, 404; Senior standing in Parks, Recreation and Tourism Management; grade-point ratio equivalent to Clemson University graduation requirement; consent of instructor.

PRTM 406 Senior Seminar 1(1,0) Examination of current community recreation, resource management, therapeutic recreation, and tourism management topics that allows senior Parks, Recreation and Tourism Management students the opportunity to relate their academic studies to the latest problems, changes, and trends in the field. *Preq:* Senior standing in Parks, Recreation and Tourism Management.

PRTM 409 Methods of Recreation Research I 3(3,0) An analysis of the principle methods of recreation research, the application of descriptive statistics to recreation research, and the development of a research proposal. *Preq:* Senior standing.

PRTM 410, H410 Methods of Recreation Research II 3(3,0) A continuation of PRTM 409 to include the supervised execution and reporting of results of the research proposal developed in PRTM 409 and the application of inferential statistics to research. *Preq:* PRTM 409 or consent of instructor.

PRTM 411, H411, 611 Therapeutic Recreation for Selected Populations 3(2,3) Therapeutic recreation services for the developmentally disabled person and youth and adult corrections populations. Emphasis is directed to planning and implementation of therapeutic recreation services to the needs of clients and the goals of agencies and institutions.

PRTM 412, H412, 612 Therapeutic Recreation and Mental Health 3(3,0) Therapeutic recreation services in mental health clinics, institutions, and outdoor settings. Review of disorders and current modes of treatment as they relate to therapeutic recreation. *Preq:* PRTM 311 or consent of instructor.

PRTM 413, 613 Therapeutic Recreation for Physically Disabled 3(2,3) Examination of the potential psychological, physical, and sociological implications of disability to the individual and to the planning and directing of therapeutic recreation services. *Preq:* PRTM 311 or consent of instructor.

PRTM (ED SP) 414, 614 Recreation and Leisure for Special Populations 3(3,0) Course designed to provide class participants with practical experience in designing recreation and leisure activities for special populations (e.g., handicapped, elderly).

PRTM (ED F) 415, 615 Methods in Reducing Risks for Middle Childhood 3(2,3) See ED F415.

PRTM 416 Leisure and Aging 3(3,0) Examines the role of leisure services in later life, the needs of community-based and institutionalized elderly, and the development of service-delivery systems to meet those needs.

PRTM 421, H421, 621 Recreation Financial Resources Management 3(3,0) Analysis of recreation financial resources management. Deals with revenue sources and their allocation. *Preq:* PRTM 321 and Senior standing in Parks, Recreation and Tourism Management.

PRTM (GEOG) 430, 630 World Geography of Parks and Equivalent Reserves 3(3,0) Major international patterns in the provision and use of urban and rural parks and recreation are examined.

PRTM 431, 631 Methods of Environmental Interpretation 3(2,3) Practice and instruction in the use of equipment and methods available to the interpreter in public contact work. Coaching in presentation and evaluation of live programs and in design, execution, and evaluation of mediated

programs will be the major emphasis. Programs will be delivered to public audiences in the Clemson area. *Preq:* PRTM 330; Senior standing in Parks, Recreation and Tourism Management; or consent of instructor.

PRTM 441, 641 Commercial Recreation 3(3,0) Components of offering leisure services and products to the public by individuals, partnerships, and corporations for the purpose of making a profit.

PRTM 443, 643 Resorts in National and International Tourism 3(3,0) A variety of resort types are studied with respect to their development, organization, visitor characteristics, and environmental consequences. A case-study approach is used.

PRTM 444, 644 Tour Planning and Operations 3(3,0) Provides the opportunity to understand the psychology of touring, with emphasis on a packaged and group tours, and how tours of different types and scale are planned, organized, marketed, and operated. *Preq:* PRTM 342 or consent of instructor.

PRTM 445, 645 Conference/Convention Planning and Management 3(3,0) Provides the opportunity to understand the problems of and solutions to conference and convention planning and management from both the sponsoring organization and facility manager's perspectives.

PRTM 446, 646 Community Tourism Development 3(3,0) Provides a community-based perspective of the organizational, planning, development and operational needs for a successful tourism economy at the local level. *Preq:* PRTM 342 or consent of instructor.

PRTM 447, 647 Perspectives on International Travel 3(3,0) Using the United States as a destination, international travel patterns and major attractions are presented. Factors which restrain foreign travel to the United States are analyzed.

PRTM 448, 648 Microorganization of the Tourism Industry 3(3,0) Systematic on-site study of the organization, structure, and operation of the tourism industry at a micro level. *Preq:* Junior standing and consent of instructor.

PRTM 452, 652 Campus Recreation 3(3,0) Study of the basic components required for administration of successful college union and intramural-recreation sport programs.

PRTM 472, 672 Historic Site Interpretation 3(3,0) The development and implementation of the specialized interpretive programs required at historic sites. An overview of the historic movement in the United States and its presentation to the American people. *Preq:* PRTM 330.

PRTM 473, 673 Introduction to Museology 3(2,3) An introduction to the museum concept with insight into current museum practices. Course will include principles and methods of museum practice including conservation/restoration techniques. *Preq:* PRTM 330.

PRTM 474, H474 Advanced Recreation Resources Management 3(3,0) Advanced topics in recreation resource management focusing on management strategies and techniques for addressing common resource and social problems in recreation resource management. Case studies and problem analysis will be emphasized. *Preq:* Senior standing or consent of instructor.

PRTM 490 SR Independent Study 1-3(1-3,0) In cooperation with and under supervision of a faculty member, the student will develop and execute a field study or community project. May be repeated twice for a maximum of three credits. *Preq:* Senior standing in Parks, Recreation and Tourism Management or consent of instructor.

PHILOSOPHY

Professors: W. A. Maker, *Acting Chair*; S. Silvers; *Associate Professors:* M. A. Martin, T. G. May, T. J. Oberdan, S. A. Sarris, D. E. Wueste; *Assistant Professor:* J. L. McCollough; *Visiting Instructor:* J. U. Neisser

PHIL 101, H101 Introduction to Philosophic Problems 3(3,0) A discussion of representative philosophical questions which arise from human thought and action. Characteristic topics are as follows: values, knowledge, human nature, and society.

PHIL 102, H102 Introduction to Logic 3(3,0) Introduction to methods of evaluating arguments. Simple valid argument forms are given which can be joined together to produce the logical form of virtually any argument. Informal fallacies may also be considered.

PHIL 103 Introduction to Ethics 3(3,0) Philosophical consideration of the nature of ethics, basic ethical issues, and problems and modes of ethical reasoning.

PHIL 303 Philosophy of Religion 3(3,0) A critical consideration of the meaning and justification of religious beliefs. Representative topics are as follows: The Nature and Existence of God; Religious Knowledge; Religious Language; The Problem of Evil.

PHIL 304 Moral Philosophy 3(3,0) A study of moral problems, their origin in conflicts between duty and desire, and alternative solutions proposed by classical and contemporary writers.

PHIL 315 Ancient Philosophy 3(3,0) Origins and development of rationality as found in the thought of selected philosophers, such as Socrates, Plato, and Aristotle.

PHIL 316 Modern Philosophy 3(3,0) Development of the modern view as seen in major Western philosophers of the 16th, 17th, and 18th centuries. The thought of Descartes, Spinoza, Leibniz, Locke, Berkeley, and Hume may be considered to illustrate the development of rationalism and empiricism.

PHIL 317 Nineteenth-Century Philosophy 3(3,0) Development of 19th-century philosophy with emphasis on selected works of philosophers such as Kant, Hegel, Marx, Nietzsche, and Kierkegaard.

PHIL 318 Twentieth-Century Philosophy 3(3,0) Study of the dominant movements in Western philosophy today, particularly existentialism and analytical philosophy. The object is to acquire sufficient background for reading current philosophical or philosophically-influenced literature.

PHIL 320 Social and Political Philosophy 3(3,0) Critical consideration of the views of some major philosophers on the nature of the individual's relation to society and the state in the context of their wider philosophical (logical, epistemological, metaphysical, and ethical) doctrines. Philoso-

phers examined may include Plato, Aristotle, Augustine, Hobbes, Rousseau, Mill, Marx, Hegel, Rawls, and Nozick.

PHIL 323 Theory of Knowledge 3(3,0) Examination of concepts, criteria, and decision procedures underlying rational belief and the justification of knowledge claims. Representative answers to the problem of skepticism are considered, with special attention to some leading theories of knowledge.

PHIL 324 Philosophy of Technology 3(3,0) This course will examine technology and representative philosophical assessments of it with a focus on understanding its impact on the human condition.

PHIL 325 Philosophy of Science 3(3,0) Philosophical study of problems generated by science, but which are not themselves scientific, such as what comprises a scientific theory; how scientists formulate theories and acquire knowledge; what, if anything, differentiates science from other ways of knowing; what role concepts play in scientific knowledge; and whether scientific progress is rational.

PHIL 326 Science and Values 3(3,0) Examination of several features of the relation between science and values. Topics may include the following: the ethical and social obligations of scientists, the role of value judgements in scientific practice, and the influence of social and political values on science and scientists.

PHIL 327 Philosophy of Social Science 3(3,0) Inquiry into the philosophical foundations of social science, in particular questions of objectivity, explanatory structure, causality, agency, normativism and naturalism, and social determination of knowledge.

PHIL 330 Contemporary Issues in Philosophy 3(3,0) Examination of a variety of issues of broad concern to philosophers today. Issues may vary. With departmental consent, course may be repeated one time for credit.

PHIL 333 Metaphysics 3(3,0) Examination of issues and problems concerning the ultimate nature of reality. Topics may include the appearance/reality distinction, the nature of existence, freedom and determinism, personal identity, idealism and realism.

PHIL 335 Philosophy and Film 3(3,0) Introduction to philosophical thought about film, the study of films, and theoretical and critical writing about films. Both philosophical problems about the nature of film and philosophical problems exhibited in films will be considered.

PHIL 343 Philosophy of Law 3(3,0) Explanation of the nature of legal theory and the law through a critical examination of the basic concepts and principles of these fields.

PHIL 344, H344 Business Ethics 3(3,0) Study of ethical issues created by business activities, relating them to fundamental questions of ethics generally. Representative topics: hiring, firing, promotions, business and minorities, organizational influence in private lives, consumer interests, economic justice, and reindustrialization.

PHIL 345 Environmental Ethics 3(3,0) Study of ethical problems in our dealings with the rest of nature, and of how they relate to ethics in general. Representative topics: the basis of ethics,

nature and intrinsic value, duties to future generations, economics and the environment, rare species, animal rights, ethics and agriculture, energy doctrine.

PHIL (NURS) 350 Technology and Philosophy in Nursing 3(3,0) See NURS 350.

PHIL 355 Philosophy of Mind and Cognitive Science 3(3,0) Critical examination of philosophical and scientific theories of mental phenomena and of the relationship between mental and material phenomena. Theories of Mind-Body Dualism, Monism, Functionalism, Eliminative and Reductive Materialism, Connectionism, and the status of folk psychology versus cognitive neuroscience will be studied.

PHIL 360 Symbolic Logic 3(3,0) Introduction to the basic concepts of modern symbolic logic, including the symbolization of statements and arguments and the techniques of formal proof.

PHIL 365 Philosophy of Language 3(3,0) Examination of issues within and theories about language and its place in philosophical discussion, including such questions as the nature of meaning, the role of symbols in thought, the concept of truth, and the structure of language.

PHIL 401, 601 Studies in the History of Philosophy 3(3,0)¹ In-depth study of a selected philosopher, philosophical school, or movement. Topics will vary. With departmental consent, may be repeated once for credit. *Preq:* Consent of instructor.

PHIL 402, 602 Topics in Philosophy 3(3,0)¹ Thorough examination of a particular philosophical topic, issue, or problem. Topics will vary. With departmental consent, course may be repeated one time for credit. *Preq:* Consent of instructor.

PHIL 499 Independent Study 1-3(1-3,0) Course of study designed by the student in consultation with a faculty member who agrees to provide guidance, discussion, and evaluation of the project. The student must select and confer with the faculty member early enough for their plan to be approved by the department chair prior to registration. *Preq:* Consent of instructor.

¹ Current topics and course descriptions available in the department's course-offering brochure.

PHYSICAL SCIENCE

PH SC 107 Introduction to Earth Science 4(3,3) Survey of topics in geology, meteorology, astronomy, and oceanography emphasizing comprehension and practical application of earth science concepts to experiments and activities appropriate for the elementary school classroom. Enrollment preference given to Early Childhood and Elementary Education majors.

PH SC 108 Introduction to Physical Science 4(3,3) Survey of topics in chemistry and physics emphasizing comprehension and practical application of physical science concepts to experiments and activities appropriate for the elementary school classroom. Enrollment preference given to Early Childhood and Elementary Education majors.

PHYSICS

Professors: P. B. Burt, D. D. Clayton, M. S. Daw, L. L. Larcom, M. F. Larsen, P. J. McNulty, *Chair*; J. R. Manson, J. W. Meriwether, J. R. Ray, G. X. Tessema, R. C. Turner; *Associate Professors:* T. F. Collins, P. J. Flower, J. A. Gilreath, D. H. Hartmann, B. S. Meyer, P. A. Steiner; *Assistant Professors:* D. L. Hysell, J. P. McCarten; *Visiting Associate Professor:* D. D. Mailey; *Visiting Assistant Professors:* S. S. El-Teaty, L. Jin, D. R. Roth

PHYS 101 Current Topics in Modern Physics 1(0,2) Demonstrations and lectures serving as an introduction to different areas of physics and astronomy will be presented by various members of the staff. These areas may include such topics as astrophysics, energy, relativity, and weather, as well as visits to the planetarium.

PHYS 122, H122 Physics with Calculus I 3(3,0)¹ The first of three courses in a calculus-based physics sequence. Topics include vectors, laws of motion, conservation principles, rotational motion, oscillations, and gravitation. *Coreq:* MTHSC 108.

PHYS 124 Physics Laboratory I 1(0,3) Introduction to physical experimentation with emphasis on mechanical systems, including oscillatory motion and resonance. Computers are used in the experimental measurements and in the statistical treatment of data. *Coreq:* PHYS 122.

PHYS 200 Introductory Physics 4(3,2)¹ Introduction to classical physics. Includes elements of mechanics, heat, electricity, and light. This course may not be substituted for PHYS 122 but may be substituted for PHYS 207, only with the approval of the Department of Physics and Astronomy. *Coreq:* MTHSC 105 or equivalent.

PHYS 207 General Physics I 4(3,2)¹ Introductory course for students who are not majoring in physical science or engineering. This course covers such topics as mechanics, waves, fluids, and heat. *Coreq:* A course that includes algebra and trigonometry.

PHYS 208 General Physics II 4(3,2)² Continuation of PHYS 207. This course covers such topics as electricity, magnetism, electromagnetic waves, optics, and modern physics. *Preq:* PHYS 207.

PHYS 221, H221 Physics with Calculus II 3(3,0)² Continuation of PHYS 122. Topics include thermodynamics, kinetic theory of gases, electric and magnetic fields, electric currents and circuits, and motions of charged particles in fields. *Preq:* PHYS 122.

PHYS 222, H222 Physics with Calculus III 3(3,0) Continuation of PHYS 221. Topics include wave motion, electromagnetic waves, interference and diffraction, relativity, atomic particles, and atomic and nuclear structure. *Preq:* PHYS 221.

PHYS 223 Physics Laboratory II 1(0,3) Experiments in heat and thermodynamics, electrostatics, circuits, and magnetism. Computers are used in the statistical treatment of data. *Coreq:* PHYS 221.

PHYS 224 Physics Laboratory III 1(0,3) Experiments involve atomic, molecular, and nuclear systems. The wave particle dualism of light and matter is emphasized. Calculators and computers are used in statistical treatment of data. *Coreq:* PHYS 222.

PHYS 240 Physics of the Weather 3(3,0) A descriptive introduction to meteorology. Includes atmospheric thermodynamics, solar radiation, heat budget, atmospheric circulation, force laws governing air motion, fronts, precipitation, synoptic prediction. Special topics of current interest such as the effect of environmental pollution on weather, and the effect of weather on health are included.

PHYS 262 Physics of Music 3(3,0) An elementary, nontechnical study of the relationship between the laws of physics and the production of music for the music student or layman who wishes to understand the physical principles of the art. Topics include mechanical and acoustical laws, harmonic analysis, musical scales, sound production in instruments, physiology of hearing, etc.

PHYS 290 Physics Research 1-3(0,3-9) This individual research project may be performed in any area of experimental or theoretical physics or astronomy. Work will be performed under the supervision of a physics or astronomy faculty member. Project need not be original but must add to the student's ability to carry out research. May be repeated for a maximum of six credits. *Preq:* Consent of instructor and minimum grade-point ratio of 3.0.

PHYS 300, H300 Introduction to Research 1(2,0) Designed to acquaint students with current research in physics. Seminars will be provided where research activities in various areas of physics and astronomy are summarized. The course will provide a basis for students to choose a suitable topic for a senior thesis. *Preq:* Junior standing in physics.

PHYS 311 Introduction to the Methods of Theoretical Physics 3(3,0) A survey of the methods and techniques of problem-solving in Physics. Emphasizes the application of mathematical techniques to the solution of problems of vectors, fields, and waves in mechanics, electromagnetism and quantum physics. *Preq:* PHYS 222 or consent of instructor.

PHYS 321, H321, 621 Mechanics I 3(3,0) Statics, motions of particles and rigid bodies, vibratory motion, gravitation, properties of matter, flow of fluids. *Preq:* PHYS 221.

PHYS 322, H322, 622 Mechanics II 3(3,0) Dynamics of particles and rigid bodies, Lagrangian and Hamiltonian formulations, vibrations of strings, wave propagation. *Preq:* PHYS 321 or consent of instructor.

PHYS 325, H325, 625 Experimental Physics I 3(1,4) Introduction to experimental modern physics, measurement of fundamental constants, repetition of crucial experiments of modern physics (Stern-Gerlach, Zeeman effect, photoelectric effect, etc.). *Coreq:* PHYS 321 or consent of instructor.

PHYS 326, H326, 626 Experimental Physics II 3(1,4) Continuation of PHYS 325.

PHYS 355, H355 Modern Physics 3(3,0) A study of the topics of modern physics, including relativity, atomic physics, quantum mechanics, condensed-matter physics, nuclear physics, and elementary particles. *Preq:* PHYS 222, MTHSC 206, or consent of instructor.

PHYS 401, H401 Senior Thesis (1-3) A semi-original theoretical, experimental, or computational research project performed under the direction of

a faculty member. Fields available include astronomy, astrophysics, atmospheric physics, biophysics, high energy physics, relativity, solid state physics, and statistical mechanics. May be repeated for a maximum of six credits. *Preq:* Nine credits of physics at the 300/400 level.

PHYS 417, H417, 617 Introduction to Biophysics I 3(3,0) Introduction to the application of physics to biological problems. Topics include a review of elementary chemical and biological principles, physics of biological molecules, and fundamentals of radiation biophysics. *Preq:* MTHSC 206, PHYS 221, or consent of instructor.

PHYS 420, 620 Atmospheric Physics 3(3,0) A study of the physical processes governing atmospheric phenomena. Topics include thermodynamics of dry and moist air, solar and terrestrial radiative processes, convection and cloud physics, precipitation processes, hydrodynamic equations of motion and large-scale motion of the atmosphere, numerical weather prediction, atmospheric electricity. *Preq:* MTHSC 108, PHYS 208 or 221.

PHYS 432, H432, 632 Optics 3(3,0) This course covers a selection of topics, depending on the interest of the student. Topics covered may include the formation of images by lenses and mirrors, design of optical instruments, electromagnetic wave propagation, interference, diffraction, optical activity, lasers, and holography. *Preq:* PHYS 221.

PHYS 441, H441, 641 Electromagnetics I 3(3,0) Study of the foundations of electromagnetic theory. Topics include electric fields, electric potential, dielectrics, electric circuits, solution of electrostatic boundary-value problems, magnetic fields, and magnetostatics. *Preq:* PHYS 221 and MTHSC 208, or consent of instructor.

PHYS 442, H442, 642 Electromagnetics II 3(3,0) Continuation of PHYS 441. Study of the foundations of electromagnetic theory. Topics include magnetic properties of matter, microscopic theory of magnetization, electromagnetic induction, magnetic energy, AC circuits, Maxwell's equations, and propagation of electromagnetic waves. Other topics may include waves in bounded media, antennas, electrodynamics, special theory of relativity, and plasma physics. *Preq:* PHYS 441 or consent of instructor.

PHYS 446, H446, 646 Solid State Physics 3(3,0) An introductory treatment of the crystal structure of solids and the properties of solids which depend on crystal structure, free electron model of metals, band theory of solids, Brillouin zones, crystalline defects, and diffusion. *Preq:* PHYS 222 or consent of instructor.

PHYS 452, H452, 652 Nuclear and Particle Physics 3(3,0) Study of our present knowledge concerning subatomic matter. The experimental results are stressed. Topics discussed include particle spectra, detection techniques, Regge pole analysis, quark models, proton structure, nuclear structure, scattering and reactions.

PHYS 455, H455, 655 Quantum Physics I 3(3,0) Discussion of solution of the Schrodinger equation for free particles, the hydrogen atom and the harmonic oscillator. *Preq:* PHYS 322 and 441, or consent of instructor.

PHYS 456, H456, 656 Quantum Physics II 3(3,0) Continuation of PHYS 455. Application of principles of quantum mechanics as developed in PHYS 455 to atomic, molecular, solid state and nuclear systems. *Preq:* PHYS 455.

PHYS 465, H465, 665 Thermodynamics and Statistical Mechanics 3(3,0) Study of temperature development of the laws of thermodynamics and their application to thermodynamic systems. An introduction to low temperature physics is given. *Preq:* Six hours of physics beyond PHYS 222 or consent of instructor.

PHYS 475, 675 Selected Topics 1-3(0,3-0-9) Comprehensive study of a topic of current interest in the field of physics. May be taken for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

¹ Credit for a degree will be given for only one of the following: PHYS 5122, 200, 207.

² Credit for a degree will be given for only one of the following: PHYS 208, 221.

PLANNING STUDIES

Professor: B. C. Nocks; *Associate Professors:* K. R. Brooks, J. B. London; *Assistant Professors:* M. G. Cunningham, J. T. Farris; *Lecturer:* R. W. Bainbridge

C R P 405, 605 Urban Genesis and Form 3(3,0) This course is intended to familiarize professional students in the environmental design disciplines concerning the origin, development, and growth of cities to enable them to understand the ever accelerating growth of urbanism and increasing complexity or urban organism. *Preq:* Consent of instructor or department chair.

C R P 411, 611 Introduction to City and Regional Planning 3(3,0) The purpose of the course is to introduce students from a variety of disciplines to City and Regional Planning. Spatial and nonspatial areas of discipline are explored through a wide ranging lecture/seminar program. *Preq:* Consent of instructor or department chair.

C R P 415 Small City and Rural Planning 3(3,0) Examines current and future aspects and challenges of small urban centers and rural areas. Course may focus on a wide range of subjects—design, economic, social, political, physical, natural resources, and environmental—depending on the emphasis at the time.

C R P 472, 672 Planning Process and Administration 3(3,0) Course outlines a conceptual framework of planning organizations and tools used in the planning process; potentials of planning and management approaches that address the relationship and integration between techniques and instruments. *Preq:* Consent of instructor.

C R P 473 Government and Planning Law 3(3,0) Complete coverage of the laws and ordinances relating to redevelopment, subdivision control, zoning, official mapping, and other topics including interpretation, philosophy, enabling legislation and model ordinances. The legal basis of current and long-range planning policy is discussed. *Preq:* Consent of instructor or department chair.

C R P 483, 683 Seminar on Planning Communication 3(3,0) Informal means open for plan implementation. The organization of effective public information and education programs, use of citizen advisory committees, and application of other implementation techniques. *Preq:* Consent of instructor or department chair.

PLANT PATHOLOGY

Professors: N. D. Camper, O. J. Dickerson, *Chair*; S. A. Lewis, S. W. Scott, E. I. Zehr, *Associate Professors*; R. A. Dean, D. A. Kluepfel, M. B. Riley, *Research Associate*; *Assistant Professors:* J. H. Blake, *Extension Associate*; S. N. Jeffers, S. W. Westcott III

PL PA 102, H102 Introduction to Plant Pathology Research 1-3(0,3-9) Introduction to research by participation in a plant pathology research project. The student will be guided in preparation of a proposal, completion of its objectives, interpretation of data, and composition of a final report. To be taken Pass/Fail only. *Preq:* PL PA 101 or consent of instructor.

PL PA 302, H302 Plant Pathology Research 1-3(0,3-9) Research experience in a plant pathology research project for an undergraduate who understands basic concepts of research. Students will develop research objectives, procedures, and collect data. A written report will include interpretation of results. To be taken Pass/Fail only. *Preq:* Consent of instructor.

PL PA 401, H401, 601 Plant Pathology 3(2,2) Interrelationships between fungi, nematodes, bacteria, viruses, and mycoplasmas as causal agents of plant diseases, their hosts, and the environment. Diseases caused by abiotic factors, symptom development, diagnosis, economics, control, and relationship of plant diseases to human welfare will be studied using examples of economically important diseases. *Preq:* BIOL 103, 104 or equivalents.

PL PA 402, H402, 602 Diseases of Ornamental Plants 3(2,2) Survival mechanisms, life cycles, host-parasite relationships, symptomatology, diagnosis, economics and integrated control of infectious diseases; and causal factors, diagnosis and control strategies of noninfectious diseases of ornamental plants. *Preq:* PL PA 401 or equivalent.

PL PA (ENT) 406, H406, 606 Diseases and Insects of Turfgrasses 3(2,2) Host-parasite relationships, symptomatology, diagnosis, economics, and control of infectious and noninfectious diseases of turfgrasses; life histories, diagnosis, and control of important insect pests of turfgrasses. *Preq:* ENT 301 and PL PA 401 or equivalents.

PL PA 411, 611 Plant Disease Diagnosis I 2(1,2) SS Methods and procedures used in the diagnosis of plant diseases, especially late spring and early summer diseases. Basic techniques of pure culture and identification of plant pathogens and Koch's postulates will be taught. Diagnosis of a wide variety of diseases of cultivated and wild plants will be carried out. *Preq:* PL PA 401 or equivalent.

PL PA 451, 651 Bacterial Plant Pathogens 3(2,3) F Odd-numbered years. The nature, development, and control of plant diseases caused by bacteria. Taxonomic considerations, host-parasite relations

and techniques used in isolating, identifying, and preserving bacterial plant pathogens. *Preq:* MICRO 305, PL PA 401, or consent of instructor.

PL PA 456, H456, 656 Plant Virology 3(2,3) S Even-numbered years. Plant viruses with emphasis on their morphology, biochemistry, purification and transmission; symptoms resulting from virus infection; virus-vector relationships; and serological procedures. The importance and control of plant virus diseases will be discussed. *Preq:* BIOL 103 and any biochemistry or plant physiology course.

PL PA 458, H458, 658 Plant Parasitic Nematodes 3(2,3) F Even-numbered years. Morphology and taxonomy of stylet-bearing nematodes and their relationship with plant diseases. *Preq:* BIOL 103, 104 or 110, 111.

PLANT PHYSIOLOGY

PL PH 320 Plant Medicine and Magic 3(3,0) Study of the use of compounds of plant and fungal origin as poisons, hallucinogens and pharmaceuticals. *Preq:* BIOL 104 or BOT 205; CH 102; or permission of instructor.

POLITICAL SCIENCE

Professors: L. L. Duke, C. W. Dunn, W. Lasser, M. A. Morris, M. W. Slann, *Acting Chair*; S. H. Wainstock, J. D. Woodard, *Associate Professors*; B. W. Ransom, L. Xiang, *Assistant Professor*; J. M. Kelly

PO SC 101, H101 Introduction to American Politics 3(3,0) Introduction to American National Government and politics with an emphasis on the functions of governmental organizations, the behavior of political parties and personalities, and the role of public opinion.

PO SC 102, H102 Introduction to Global Issues 3(3,0) Introduction to international politics, with an emphasis on a survey of the politics of the major world regions; America's role in world affairs; and selected current international issues and problems.

PO SC 302 State and Local Government 3(3,0) The structural features, functions, and legislative, executive and judicial processes of American state and local government.

PO SC 310 Special Activities 1-3(1-3,0) Course encompasses special projects, approved by the department chair, which involve students in research, simulation, internships, or other actions requiring the study and application of political principles, and which are engaged in for at least one semester or its equivalent. *Note:* No more than six hours credit from PO SC 310, 311, and 312 may be counted toward any degree. *Preq:* Consent of instructor.

PO SC 311 Model United Nations I (0,1) Participation in United Nations simulation exercises, in competition with other colleges and universities. *Note:* No more than six hours credit from PO SC 310, 311, and 312 may be counted toward any degree. *Preq:* Consent of instructor.

PO SC 312 State Student Legislature 1(0,1) Participation in state student legislature simulation exercises, in competition with other colleges and universities in the State. *Note:* No more than six

hours credit from PO SC 310, 311, and 312 may be counted toward any degree. *Preq:* Consent of instructor.

PO SC 321 General Public Administration 3(3,0) Introduction to public administration including the elements of organization, personnel and financial management, administrative law, and administrative responsibility. *Preq:* PO SC 101 or consent of instructor.

PO SC 341 Political Science Research Methods 3(3,1) Introduction to political research, with emphasis on quantitative methods of analysis. Topics include research design, measurement, data collection, sampling, procedures and applications of statistical techniques to research problems in political science. Laboratory stresses computer use for elementary data analysis. *Preq:* MTHSC 101 and PO SC 101 or equivalent or consent of instructor.

PO SC 351 Classical Political Thought 3(3,0) Political philosophy from the pre-Socratic period to Machiavelli. *Preq:* PO SC 101 or consent of instructor.

PO SC 352 Modern Political Thought 3(3,0) The early theories of the nation state in the 16th century and the major political thinkers, problems and movements through the 20th century. *Preq:* PO SC 101 or consent of instructor.

PO SC 361, H361 International Politics in Crisis 3(3,0) Factors contributing to the prevalence of tension and violence in the contemporary global arena are identified and analyzed, with particular emphasis on political, economic, and military roots and manifestations of conflict. *Preq:* PO SC 102 or consent of instructor.

PO SC 371 Comparative European Politics 3(3,0) Major emphasis on the United Kingdom, France, Germany, and the U.S.S.R., with brief attention given to Italy and Switzerland. Current methods of comparison will be studied and applied to the formal and informal functioning of these governments. *Preq:* PO SC 102 or consent of instructor.

PO SC 373, H373 Third World Politics 3(3,0) Survey of policies and problems of development of Third World states and their implications for the United States. *Preq:* PO SC 102 or consent of instructor.

PO SC 375, H375 European Integration 3(3,0) Survey course analyzing increasing institutional cooperation between European countries with a focus on the European community. *Preq:* PO SC 102 or consent of instructor.

PO SC 379 Directed Study in Comparative and International Politics 3(3,0) Readings and research in comparative government and society and international affairs. *Preq:* PO SC 102 or consent of instructor.

PO SC 381 African American Politics 3(3,0) Examination of African American political thought, interests and agenda setting, and dynamics of African Americans' participation in political and governmental decision making. *Preq:* PO SC 101 or consent of instructor.

PO SC H390 Junior Honors Research 1(1,0) Readings and research in conjunction with an approved political science course at the 300 or 400 level. Honors status required.

PO SC 403 Congressional Politics 3(3,0) Examination of the behavior and processes of decision making in the American Congress together with an analysis of the interaction among Congress and the executive and judicial branches of the national government. *Preq:* PO SC 101 or consent of instructor.

PO SC 404, 604 Gender and Politics 3(3,0) A survey course analyzing the experience of women in the American political system. Contemporary political issues confronting women will be discussed in the light of feminist history and the nature of the American Political system. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 405 Presidential Leadership 3(3,0) Examination of the organizational patterns, administrative behavior, and political forces in the Presidency with considerable emphasis on relations between the Presidency and Congress, courts, and administrative regulatory agencies. *Preq:* PO SC 101 or consent of instructor.

PO SC 407 Religion and American Politics 3(3,0) Examination of the impact of religion on American politics, including an analysis of the role of religion in politics, political behavior of major religious groups, constitutional issues and voting behavior. *Preq:* PO SC 101 or consent of instructor.

PO SC 408 Topics in American Government 3(3,0) Examination of selected themes and/or issues in an area of American government, public policy, or public law. May be repeated once for credit. *Preq:* PO SC 101 or consent of instructor.

PO SC 409, 609 Directed Study in American Institutions 3(3,0) Supervised reading and/or research in selected areas of American government. *Preq:* Twelve semester hours in political science and consent of instructor.

PO SC 423, 623 Urban Politics 3(3,0) Interaction of political, technical, and administrative processes in urban America. Special emphasis is given to the history and future of urban areas. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 426, 626 Total Quality Management in the Public Sector 3(3,0) Examination of the principles of total quality management: a systemic, integrated approach to excellence in administration. Application to the public sector, with emphasis on empowerment, strategic planning, teamwork, quality assurance, responsiveness to customer/client needs, and education. Focuses on the works of W. Edwards Deming and other leaders. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 427, 627 Public Personnel Management 3(3,0) Government personnel systems; current trends and problems; essentials of recruitment, classification, compensation, motivation, evaluation, training, and discipline. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 428, 628 National Security Policy 3(3,0) A study of the problems in formulating policies of national defense, examination of alternatives, consequences and effectiveness of current techniques in nuclear weaponry, guerrilla and conventional warfare. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 432, 632 American Constitutional Law I 3(3,0) A brief introduction to the judicial process followed by a detailed examination of leading

cases pertaining to the judiciary, the Congress, the Presidency, and the federal system. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 433, 633 American Constitutional Law II 3(3,0) Examination of the relationship of the individual to his government, focusing on the the safeguards of liberty and property including freedoms of speech, press and religion, and criminal procedures. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 434 Law, Courts, and Politics 3(3,0) Introduction to the role of law, judges, and courts in the American political system, focusing on the nature of the legal system; legal methods; the role of courts in statutory construction and in the administrative process; and judicial activism and restraint. *Preq:* PO SC 101 or consent of instructor.

PO SC 435 Criminal Law 3(3,0) Examination of the criminal justice system with special emphasis on the constitutional requirements for criminal procedure, and on the relationship between legal theory and practice in the criminal justice area. *Preq:* PO SC 101 or consent of instructor.

PO SC 442, 642 Political Parties and Elections 3(3,0) Study of the distinctive features of the American two-party system with emphasis on presidential elections. Parties are examined as formal organizations, coalitions of voters and interest groups, coordinators of nomination and election processes, and managers of policy-making institutions. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 443 The Mass Media in Politics 3(3,0) Course examines the nature of public opinion, its social and political context, the social-psychological processes basic to it, the dynamics of its formation and change and its measurements. *Preq:* PO SC 101 or consent of instructor.

PO SC 448 Campaign Strategy and Tactics 3(3,0) Practical introduction to the planning and execution of a political campaign, designed for candidate, manager and others who play key roles in a campaign. Covers the use of pertinent data, targeting, issues, organization, use of the media, direct mail, finance, etc. Includes application of those aspects to a campaign. *Preq:* PO SC 101 or consent of instructor.

PO SC 453 American Political Thought 3(3,0) American political philosophy from the 17th century to the present with an emphasis on political and social developments since the 1770s. *Preq:* PO SC 101 or consent of instructor.

PO SC 454, 654 Southern Politics 3(3,0) Southern politics since 1950 with emphasis upon the characteristics of sectional politics, decline of the one-party system, impact of desegregation and civil rights activism, political resurgence of the South in the 1970s and its impact on national politics. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 457, 657 Political Terrorism 3(3,0) Examination and analysis of the international phenomenon of terrorism in terms of origins, operations, philosophy, and objectives. *Preq:* PO SC 102, Junior standing, or consent of instructor.

PO SC 458, 658 Political Leadership 3(3,0) Comparative examination of political leaders, focusing particularly on types, methods, and conse-

quences of leadership, and on the relationship between leaders and followers. *Preq:* PO SC 101, Junior standing, or consent of instructor.

PO SC 462, 662 International Law and Organizations 3(3,0) Survey of obstacles to and advances in law and order in international relations. *Preq:* PO SC 102, Junior standing, or consent of instructor.

PO SC 463 United States Foreign Policy 3(3,0) Focus on foreign policy in its historical perspective, examining the decision-making process in foreign policy; evaluates contemporary American capabilities; and analyzes specific issues. *Preq:* PO SC 102, Junior standing, or consent of instructor.

PO SC 465 Foreign Policies of the Major Powers 3(3,0) Study in the foreign policies of the leading world powers with special reference to the geographic, economic, historical and political determinants of each. A general introduction to the field of foreign policy. United States foreign policy is not emphasized. *Preq:* PO SC 102 or consent of instructor.

PO SC 468 Topics in International/Comparative Politics 3(3,0) Examination of selected themes and/or issues in an area of international relations or comparative politics. May be repeated once for credit. *Preq:* PO SC 102 or consent of instructor.

PO SC 471 Russian Politics 3(3,0) Introduction to Russian political institutions and culture since 1991 with a consideration of the Russian relationship with other member republics of the Commonwealth of Independent States. *Preq:* PO SC 102 or consent of instructor.

PO SC 472 Japan and East Asia: Politics, Government, and Foreign Policy 3(3,0) Survey of Japanese politics, government, economy, and foreign policy, primarily in East Asia. *Preq:* PO SC 102 or consent of instructor.

PO SC 475 Political Systems of Latin America 3(3,0) Examination of political processes in Latin America from both institutional and national perspectives. *Preq:* PO SC 102 or consent of instructor.

PO SC 476 Politics of the Middle East 3(3,0) Comparative examination of the political processes of the Middle East, emphasizing a socio-cultural approach to the problems of political development. Overview of the course concentrates upon the Arab and non-Arab states of Jordan, Lebanon, Syria, United Arab Republic, Iran, Israel, and Turkey. *Preq:* PO SC 102 or consent of instructor.

PO SC 477 Chinese Politics 3(3,0) Concepts and operation of the political system of contemporary China. Emphasis on historical and cultural understanding of Chinese politics in the 20th century. *Preq:* PO SC 102 or consent of instructor.

PO SC 482 The Political Novel and the Cinema 3(3,0) Consideration of how political science is treated in political novels and cinema, and how political opinions are shaped by these media. *Preq:* PO SC 101 or consent of instructor.

PO SC H490 Senior Honors Thesis Research 3(3,0) Reading and research related to the senior honors thesis.

PO SC H491 Senior Honors Thesis 3(3,0) Research and writing of the senior honors thesis.

POULTRY SCIENCE

Professors: G. P. Birrenkott, Jr.; B. L. Hughes, D. V. Maurice, T. R. Scott, *Chair*; P. A. Skewes, R. J. Thurston; *Assistant Professor:* M. A. Hall; *Lecturer:* J. E. Hill

PS 101 Avian Pets—Biology and Owner Responsibilities 1(1,0)F Systematic coverage of the many types of birds that humans keep as social companions. The nutrition, environmental considerations, reproductive habits, health, and legal and economic aspects of these pets will be considered.

P S 102 Poultry Techniques 1(0,2)F Basic principles in the handling and production of poultry will be discussed and demonstrated. The student will receive hands-on experience and visit commercial operations to view equipment, facilities, and production techniques. *Preq:* Consent of instructor.

P S 201 Poultry Husbandry 3(3,0)F A study of the principles of poultry production and marketing and of the anatomy and physiology of the economically important poultry and game bird species. *Preq:* Consent of instructor.

P S 323 Poultry and Poultry Products Evaluation 2(0,4) Selection of layers, broilers, and turkeys. Grading of poultry products according to USDA grade standards will also be studied. Students enrolled in this course are eligible to compete in intercollegiate poultry judging contests. May be taken for a maximum of four credits. *Preq:* P S 201 or consent of instructor.

PS 355, 655 Poultry Products Grading and Technology 3(2,3)S Odd-numbered years. Factors important in the quality of poultry products are considered. The effects of production, handling, packaging and storage on consumer acceptability are discussed. Quality evaluation will be considered from the standpoint of tenderness, flavor, microbiology, and USDA grades.

PS 400, 600 Avian Physiology 3(3,0)S Even-numbered years. Detailed study of the structure and function of organ systems of avian species with emphasis on digestion and reproduction. Students are given an opportunity to study organ system(s) of their choice using quantitative physiological techniques. *Preq:* AN PH 301, P S 201, or consent of instructor.

P S 402, 602 Poultry Management 3(2,2)S Odd-numbered years. Continuation of P S 201 which emphasizes management, decision-making, and application of technology to the commercial production of poultry and poultry products. *Preq:* P S 201 or consent of instructor.

P S 405, 605 Selected Topics 1-4(1-3,0-3) Topics of interest to the student at the undergraduate, graduate, and professional levels. Course is designed to give experience with avian problems not covered in other courses or on thesis research. May be repeated for a maximum of six credits, but only if different topics are covered.

PS 406, 606 Special Problems 1-3(0-3,9) Research problems of special interest to the student. Course is designed to give laboratory experience and concentrated study in an area not covered in depth in other courses. Cumulative maximum of three credits. *Preq:* Consent of instructor.

PS 451, 651 Poultry Nutrition 2(2,0)F Odd-numbered years. The nutrient requirements of chickens, turkeys, and game birds and methods of determining these requirements are discussed. Deficiencies and excesses of vitamins and minerals and the effects of naturally occurring toxins are considered. Hand formulation and linear programming are introduced.

PS 453, 653 Poultry Nutrition Laboratory 1(0,3) Course to impart training in basic laboratory skills and to familiarize students with common laboratory methods used in poultry nutrition.

P S 458, 658 Avian Microbiology and Parasitology 3(3,0)F Even-numbered years. Agents causing poultry diseases; the diagnosis, prevention, and treatment of specific diseases and their economic and public health significance.

P S 460, 660 Seminar 1(1,0) Current research reported in journals covering the various areas of avian science. Students practice interpretation of technical material for laymen. May be taken for a maximum of two credits. *Preq:* Consent of instructor.

PS 471 Practicum 1-4(0,2-9) Practical, supervised experience in an approved commercial organization dealing with poultry production, processing, or distribution. The student will submit monthly reports during the practicum and will conduct a departmental seminar at its conclusion. *Preq:* Junior standing and consent of instructor.

PSYCHOLOGY

Professors: T. R. Alley, L. Berger, S. N. Cole, P. A. Connor-Greene, E. H. Galluscio, *Chair*; D. D. Moore, R. H. Nowaczky; *Associate Professors:* E. G. Brainerd, Jr., R. L. Campbell II, L. I. Park, D. J. Senn, B. R. Stephens, F. S. Switzer III, J. G. Williams; *Assistant Professors:* C. C. Pagano, R. Perlow, M. A. Taylor, R. A. Tyrrell; *Visiting Assistant Professors:* M. R. Guley, J. W. McHoskey

PSYCH 101, H201 Introduction to Psychology 3(3,0) Introduction to the study of behavior. Analysis of the biological bases of behavior, learning, thinking, motivation, perception, human development, social behavior, and the application of basic principles to more complex phenomena such as education, personal adjustment, and interpersonal relations.

PSYCH 205 Research Methods and Measurement 3(3,0) Survey of research design used in psychology with emphasis on designs other than experimental design. Topics include attitude measurement, scaling techniques, field and observational research, and questionnaire construction. *Preq:* PSYCH 201.

PSYCH 210, H210 Introductory Experimental Psychology 4(3,3) Introduction to data analysis of experimental and correlational research in psychology. Emphasis is placed on the applications and logical nature of statistical reasoning. Laboratory periods stress the techniques of data analysis including analysis using microcomputers. *Preq:* PSYCH 201 or consent of instructor.

PSYCH 295 Careers in Psychology 2(2,0) Presentation of career alternatives within psychology, a review of strategies for successful career deci-

sion making and planning, and information on managing a career in psychology. Not open to students who have previously taken PSYCH 101.

PSYCH 301 Applied Psychology 3(3,0) Course emphasizes the application of theories and research to the solution of problems in the community and work place. The contributions of psychology to business and industrial settings, community settings, and educational settings are considered. *Preq:* PSYCH 201.

PSYCH 303 Psychology of Adjustment 3(3,0) Course in personal adjustment dealing with appropriate and inappropriate reactions to stress, frustration, and conflict. Consideration is given to practical coping skills and techniques for managing emotions, changing one's own behavior, and improving interpersonal relationships. *Preq:* PSYCH 201 or consent of instructor.

PSYCH 306 Human Sexual Behavior 3(3,0) The subject of sexual behavior is to be approached from the psychophysiological, behavioral, and cultural points of view. Evolutionary, historical, and cross-cultural perspectives will be considered.

PSYCH 308 Women and Psychology 3(3,0) Explores the wide variety of psychological issues that concern women. Empirical research on topics such as motherhood, sex differentiation, motivation, and psychological disorders will be emphasized. *Preq:* PSYCH 201.

PSYCH 310, H310 Advanced Experimental Psychology 4(3,3) Continuation of PSYCH 210 with emphasis on conducting original research in the scientific study of human and animal behavior. Laboratory periods stress the refinement of techniques and the execution of research in a guided setting. *Preq:* PSYCH 201, 210, or achievement of a satisfactory score on the departmental competency examination.

PSYCH 320 Principles of Behavior 3(3,0) Study of basic learning principles including classical conditioning, operant conditioning, and modeling. Initial emphasis is on animal studies followed by human applications and techniques. *Preq:* PSYCH 201, 210.

PSYCH 321 Principles of Behavior Laboratory 1(0,3) Laboratory work will include animal handling and training and applications of techniques from PSYCH 320. *Coreq:* PSYCH 320.

PSYCH 324 Physiological Psychology 3(3,0) Study of human neuroanatomy with emphasis on the function of the nervous and endocrine systems. Discusses the biological basis of behavior in its normal and abnormal dimensions. *Preq:* PSYCH 201 or consent of instructor.

PSYCH 325 Physiological Psychology Laboratory 1(0,3) Demonstrations and techniques of selected physiological procedures are presented to explain the principles discussed in PSYCH 324. *Coreq:* PSYCH 324.

PSYCH 330 Motivation 3(3,0) Various aspects of motivation are considered by studying physiological, emotional, and environmental influences on behavior. The orientation is empirical rather than theoretical with emphasis on pertinent research, applications, and measurement of motives. *Preq:* PSYCH 201.

PSYCH 333 Cognitive Psychology 3(3,0) Study of higher-order mental processing in humans. Topics include memory, learning of concepts, problem solving, and the psychology of language. *Preq:* PSYCH 201.

PSYCH 334 Laboratory in Cognitive Psychology I(0,3) Selected experiments and demonstrations are conducted to reveal phenomena related to human perception, memory, reasoning, problem solving, and high-level mental processes. *Preq:* PSYCH 201 and 205 or 210 or consent of instructor. *Coreq:* PSYCH 333.

PSYCH 340 Life-Span Developmental Psychology 3(3,0) A survey of current theory and research concerned with the psychological aspects of human growth and development across the entire life span. Major topics include developmental methods, physical maturation, cognition, socialization, personality, psycholinguistics, intelligence, learning, behavior problems, and exceptionality. *Preq:* PSYCH 201.

PSYCH 344 Psychology of Adolescence 3(3,0) Study of the psychosocial processes of adolescence. Major emphasis is on personality development, growth of thinking, social and sexual maturation, and variations in adolescence. *Preq:* PSYCH 201.

PSYCH 345 Adulthood and Aging 3(3,0) Special consideration of the major psychological processes of aging as they relate to individual behavior and adaptation. Included are the influences of aging on the body, learning and psychomotor skills, thinking and intelligence, employment and productivity, personality, and psychopathology. Opportunity for contact with institutionalized and noninstitutionalized elderly persons is provided. *Preq:* PSYCH 201.

PSYCH 352 Social Psychology 3(3,0) A survey course analyzing human social behavior from the perspective of the individual as a participant in social relationships. Major emphasis is on the study of such contemporary social processes as attitude formation and change, interpersonal relations, conformity, conflict resolution, aggression and violence, social communication, and group phenomena. *Preq:* PSYCH 201.

PSYCH 355 Environmental Psychology 3(3,0) Consideration of the influences of the physical environment on human behavior. Topics include perception of and adaptation to the environment, effects of physical design on behavior, and individual reactions to environmental stressors. *Preq:* PSYCH 201 or consent of instructor.

PSYCH 364 Industrial Psychology 3(3,0) Reviews the perception of work from the pre-industrial revolution to the present. Comparative approaches to motivation, development, maintenance, and attraction of successful work behaviors are discussed. Topics include the organization's responsibilities to the community, implementing a disease- and accident-free workplace, and the effects of consumerism. *Preq:* PSYCH 201.

PSYCH 368 Organizational Psychology 3(3,0) Analysis of individual behavior for the purpose of investigating problems in organizations and increased organization effectiveness. Topics include psychological factors affecting communication, decision making, conflict, leadership, work

stress, power, and organizational change. *Preq:* PSYCH 201.

PSYCH 370 Personality 3(3,0) Introduction to the area of personality theory emphasizing psychoanalytic, behavioral, and humanistic approaches. Applications of personality theories to such topics as development and adjustment are considered, and research implications are evaluated. *Preq:* PSYCH 201.

PSYCH 415, 615 Systems and Theories of Psychology 3(3,0) Study of the development of psychology particularly during the past 100 years. Emphasis on giving the student a better perspective of present-day psychology. Focus is on the various approaches taken by influential psychologists and the conflicts among these approaches. *Preq:* PSYCH 201 and one 300-level psychology course or consent of instructor.

PSYCH 422, H422 Sensation and Perception 3(3,0) Study of psychophysical techniques of measurement and sensory and perceptual processes related to vision, hearing, and the other senses. *Preq:* PSYCH 201, and one 300-level psychology course or consent of instructor.

PSYCH 423 Sensation and Perception Laboratory I(0,3) Selected experiments are conducted to demonstrate the phenomena involved in sensation and perception. *Preq:* PSYCH 205 or 210 or consent of instructor. *Coreq:* PSYCH 422.

PSYCH 426, 626 Advanced Physiological Psychology 3(3,0) Advanced studies of the biological basis of behavior with emphasis on functional neuroanatomy and endocrinology. Topics may vary. May not be repeated for credit. *Preq:* PSYCH 324 or consent of instructor.

PSYCH 435, 635 Human Factors Psychology 3(3,0) Analyses of theoretical issues and research methods pertaining to the interaction between people and machines and human performance. Topics include information processing theory, human control systems and displays, task simulation, perceptual and motor factors limiting human performance. *Preq:* PSYCH 201, and one 300-level psychology course or consent of instructor.

PSYCH 443 Infant and Child Development 3(3,0) Cognitive, emotional, and social development from conception through childhood (up to age 12). Major theories and research findings will be covered. *Preq:* PSYCH 201 and 340, or permission of instructor.

PSYCH 454 Psychology of Human Relationships 3(3,0) Research, theory and their practical applications regarding the development, maintenance, and dissolution of human relationships. Understanding successful and unsuccessful relationships. Emphasis on improving the individual's ability to relate to other persons both interpersonally and professionally. *Preq:* PSYCH 201 and one 300-level psychology course.

PSYCH 457 Principles and Processes of Teamwork 3(3,0) Study of individual and group processes as they apply to team performance. Theories, research, and models of team functioning are examined as are applications of principles to ad hoc, business, multidisciplinary work, and computer-supported teams. *Preq:* PSYCH 201, one 300-level PSYCH course or permission of instructor.

PSYCH 459, 659 Group Dynamics 3(3,0) Review of current theory and research on small-group processes with special emphasis given to group formation and development, group structure, the dynamic forces within a group, leadership, and group problem solving and decision making. *Preq:* PSYCH 201 and one 300-level psychology course or consent of instructor.

PSYCH 462, 662 Psychology and Culture 3(3,0) Seminar examining the cultural context in which (1) psychological theories and research are generated, and (2) psychological perspectives on human diversity. Topics include the philosophical positions influencing psychological theory and research; methodological issues in the study of diversity, historical and contemporary perspectives; and cross-cultural psychological research in selected content areas. *Preq:* PSYCH 310 or consent of instructor.

PSYCH 471 Psychological Testing 3(3,0) Introduction to the theory of psychological testing emphasizing the principles of measurement and psychometric characteristics of a good psychological test. Issues in test development, administration, and interpretation are reviewed. Educational, industrial, and clinical uses of tests are examined. *Preq:* PSYCH 201 and 210 or consent of instructor.

PSYCH 480, 680 Health Psychology 3(3,0) Study of the role of health-related behaviors in the prevention, development and/or exacerbation of health problems. Emphasis on the biopsychosocial model and its application in the assessment, treatment, and prevention of health problems. *Preq:* PSYCH 201, one 300-level psychology course or consent of instructor.

PSYCH 483, 683 Abnormal Psychology 3(3,0) Study of the physiological, psychological, and cultural factors involved in such behavioral disorders as transient situational disturbances, personality disorders, psychoneuroses, psychoses, and psychosomatic disturbances. Special emphasis is placed on the advantages and disadvantages of particular conceptual models in labeling and describing behaviors as either normal or abnormal. *Preq:* PSYCH 201 and one 300-level psychology course or consent of instructor.

PSYCH 488 Theories of Psychotherapy 3(3,0) Survey of alternative theories of psychological treatment for behavioral and emotional disorders. Various theoretical assumptions, techniques, and applications of each approach are examined and compared, and case examples are considered. *Preq:* PSYCH 370 or consent of instructor.

PSYCH 489, 689 Selected Topics 3(3,0) A seminar in current topics in psychology. Topics will change from semester to semester and will be announced prior to each semester's registration. May be repeated once for credit, but only if a different topic is covered. *Preq:* PSYCH 201 and one 300-level course or consent of instructor.

PSYCH H490 Senior Division Honors Research I 2-4(2-4,0) Preparation and defense of a research proposal. The proposed project should be empirical, historical, or theoretical in nature. *Preq:* Junior standing and consent of department chair.

PSYCH H491 Senior Division Honors Research II 2-4(2-4,0) Completion of the proposed research project resulting in a written thesis. *Preq:* PSYCH H490.

PSYCH 493 Practicum in Clinical Psychology 3(1,5) Students are given an opportunity to apply classroom theory in solving individual and community problems through interaction with community agencies and other professional groups in the mental health area. The student has limited but well-controlled contact with actual clinical problems as they occur in the community environment. *Preq:* Consent of instructor.

PSYCH 495 Practicum in Applied Psychology 3(1,5) Students are provided practical experience in the area of applied psychology. The student usually will be involved in a project designed to help solve an industrial problem through a direct application of industrial or social psychology. *Preq:* Either PSYCH 352 or 364 or 454 and consent of instructor.

PSYCH 497, H497 Directed Studies in Psychology 2-4(2-4,0) Study under the direction of a faculty member of a particular topic agreed upon by the student and faculty member and submitted to the department chair for approval. May be repeated for a maximum of six credits. *Preq:* Six credits in psychology, a course in research methods, and consent of instructor.

RELIGION

Professor: L. J. Greenspoon; *Visiting Associate Professor:* N. A. Hardesty; *Visiting Assistant Professor:* Peter A. Cohen

REL 101 Introduction to Religion 3(3,0) Variety of religious experience and expression in human life.

REL 102 World Religions 3(3,0) Survey of major religious traditions of the world.

REL 301 The Old Testament 3(3,0) Survey of the books of the Old Testament with special consideration given to the development of the concepts, institutions, and theology of the ancient Hebrews.

REL 302 A Survey of New Testament Literature 3(3,0) Study of the books of the New Testament from the standpoint of their occasion, content, literary form, and basic theology.

REL 306 Judaism 3(3,0) Examination of the development of Judaism from Biblical to modern times.

REL 307 The Christian Tradition 3(3,0) Examination of the development of Christianity in Western civilization from the post-New Testament period to the present, stressing institutional growth and changes, theological currents, and interaction of Christianity with culture.

REL 308 Religions of the Ancient World 3(3,0) Selected religious movements in ancient Mesopotamia, Egypt, Canaan, and the Greco-Roman world with emphasis on movements outside the Judeo-Christian tradition.

REL 309 Religions of Asia 3(3,0) Study of religious traditions of Asia, with an emphasis on Hinduism and Buddhism.

REL 310 Religion in the United States 3(3,0) Development of religion in the United States from the Colonial period to the 20th century. Attention will be devoted to analyzing broad currents in religious movements and religious thought which have given shape to the American pluralistic experience.

REL 401, 601 Studies in Biblical Literature and Religion 3(3,0) Critical examination of a selected topic in biblical studies. Topics will vary from year to year. May be repeated once for credit. *Preq:* Consent of instructor.

REL 402, 602 Studies in Religion 3(3,0) Thorough examination of a selected topic in one or more of the religious traditions of the world or of religious life in a particular region. Topic will vary from year to year. May be repeated once for credit. *Preq:* Consent of instructor.

REL 499 Independent Study 1-3(1-3,0) Study of selected problems, issues, or movements in religion under the direction of a faculty member chosen by the student. Student and faculty member develop a course of study designed for the individual student and approved by the head of the department prior to registration. *Preq:* Consent of instructor.

RURAL SOCIOLOGY

Professor: E. L. McLean

R S 301 Rural Sociology 3(3,0) Study of human social relationships as influenced by life in the open country and in small towns and villages including considerations of the rural population, rural social institutions, processes of change in agricultural technology, and community area planning and development.

R S (SOC) 303 Methods of Social Research I 3(3,0) See SOC 303.

R S (SOC) 359, 659 The Community 3(3,0) Examination of the sociological aspects of contemporary communities and of their growth and development. Structural relations of social class, status and power and the relationships among social institutions within the community are examined. Emphasis is placed on the organization and development of communities in a constantly changing environment.

R S (SOC) 371 Population and Society 3(3,0) See SOC 371.

R S (SOC) 401, 601 Human Ecology 3(3,0) Analysis of the interrelationships between the physical world, modifications in natural environments, human settlement patterns, and institutions that both encourage and regulate environmental modification. Emphasis is placed on conditions whereby natural resources become public policy concerns. *Preq:* Sophomore standing.

R S (SOC) 471, H471 671 Demography 3(3,0) Demographic concepts, theory, and research methods for vital statistics, migration and population distribution and projections. Collection and processing of demographic data, and organization of demographic data systems. *Preq:* ANTH 201 or SOC 201 or R S 301.

R S (SOC) 495 Field Experience 3(1,8) See SOC 495.

R S (SOC) 498 Independent Study 3(1,6) See SOC 498.

RUSSIAN

Lecturer: J. Bridgwood

RUSS 101 Elementary Russian 4(3,1) Training in pronunciation, grammatical forms, and syntax with a view to giving the student the fundamentals necessary to hold simple conversations and to read simple Russian texts.

RUSS 102 Elementary Russian 4(3,1) Continuation of RUSS 101. *Preq:* RUSS 101.

RUSS 201, H201 Intermediate Russian 3(3,0) Brief review of RUSS 101 and 102 with conversation, composition, and dictation, and the beginning of more serious reading of Russian prose in short stories and plays. *Preq:* RUSS 102.

RUSS 202, H202 Intermediate Russian 3(3,0) Conversation, composition, and dictation based on readings of more difficult Russian prose than in the earlier courses. *Preq:* RUSS 201.

RUSS 398 Directed Reading 1-3(1-3,0) Directed study of selected works in Russian. May be repeated for a total of six semester credits. *Preq:* RUSS 202 or equivalent and consent of department chair.

SOCIOLOGY

Professors: K. W. Crader, R. F. Larson, J. W. Ryan, *Chair:* D. A. Ward, W. M. Wentworth; *Associate Professors:* J. M. Coggeshall, L. G. Peppers, J. P. Smith, D. K. Sturkie III, B. J. Vander Mey, M. F. White; *Assistant Professors:* J. E. Hawdon, W. M. Patterson; *Visiting Professor:* M. C. Wittig

SOC 201, H201 Introduction to Sociology 3(3,0) Sociological perspective: the study of contemporary groups, organizations, and societies in terms of human social behavior, social change, social structure, and social institutions.

SOC 202 Social Problems 3(3,0) Social problems involving the family, education, health care, political and legal systems, economy, population, environment, community; and special problems associated with age, economics, racial, status, and gender inequality.

SOC (R S) 303, H303 Methods of Social Research I 4(3,3) Introduction to methods of social research: research, design, sampling, measurement, reliability, and validity; the relationship between theory and research. Required of all Sociology majors. *Preq:* SOC 201.

SOC 310, H310 Marriage and Intimacy 3(3,0) Examination of mate selection, living together, marital relations, family planning, conflict resolution, divorce and remarriage, later life adjustments, and singlehood as a lifestyle in the United States. *Preq:* SOC 201 or consent of instructor.

SOC 311 The Family 3(3,0) Cross-cultural analysis of the family as a basic social institution; history, structure, and functions of the family in various cultures; and effects of social change on the family. *Preq:* SOC 201.

SOC 330 Industrial Sociology 3(3,0) Development of industrial society; effects of culture, social institutions, and individuals; industry and community; cross-national comparison of management styles; and a comparative analysis of work in industrial and developing nations. *Preq:* SOC 201.

SOC 331 Urban Sociology 3(3,0) Urbanization as a social process and related conditions of work, family structure, social mobility, crime, lifestyle, technology, and development of urban areas in the Third World. *Preq:* SOC 201.

SOC 350 Self and Society 3(3,0) Social psychology from the sociological viewpoint. Examination of the interactional and group influences on such individual conditions as childhood and life-course development, language, emotions, motives, sexuality, deviance, and self-concept. *Preq:* SOC 201.

SOC 351 Collective Behavior 3(3,0) Spontaneous, transitory, and sporadic group behavior: crowds, panics, riots, fads, and social movements. *Preq:* SOC 201.

SOC (R S) 359, 659 The Community 3(3,0) See R S 359.

SOC (R S) 371 Population and Society 3(3,0) Social, economic, and political consequences of population structure and change, including problems of food and resources, as well as population goals and policies in developing countries and the United States. *Preq:* SOC 201.

SOC 380 Introduction to Social Services 3(3,0) Fundamentals of casework practice, including philosophy and values, models of group work and ethics in social services work. *Preq:* SOC 201.

SOC 390 The Criminal Justice System 3(3,0) Social systems analysis of criminal justice agencies; primary focus on law enforcement and corrections and their interagency relationship with courts and prosecution. *Preq:* SOC 201.

SOC 391 Sociology of Deviance 3(3,0) Patterns of deviant behavior: subcultures, careers, and lifestyles of deviants; deviance theory and research. *Preq:* SOC 201.

SOC 392 Juvenile Delinquency 3(3,0) The nature, extent, and causes of juvenile delinquency; societal attempts to control delinquent conduct and gang violence; emergence of the juvenile justice system. *Preq:* SOC 201.

SOC 393 Criminology 3(3,0) The nature and causes of criminal behavior; societal attempts to control crime; social responses to crime, criminals, and the criminal justice system. *Preq:* SOC 201.

SOC 394, H394 Sociology of Mental Illness 3(3,0) Mental illness as a social phenomenon, including cultural and social influence, organizational settings of mental health-care delivery, legal issues, patient-therapist relationships, and mental illness intervention as social control. *Preq:* SOC 201.

SOC 396 Alcoholism: Social Causes, Consequences and Treatment 3(3,0) Issues involved in alcoholism and alcohol abuse, assessment of sociological and social-psychological theories of alcoholism and prevention; societal problems associated with the misuse of alcohol. Students who previously have taken SOC 395 may not receive credit for SOC 396. *Preq:* SOC 201 or consent of instructor.

SOC 397 Drug Abuse: Social Causes, Consequences and Treatment 3(3,0) Issues involved in drug abuse other than alcohol; assessment of sociological and social-psychological theories of drug use, abuse, and treatment; societal problems associated with the misuse of drugs other than alcohol. Students who previously have taken SOC

395 may not receive credit for SOC 397. *Preq:* SOC 201 or consent of instructor.

SOC (R S) 401, 601 Human Ecology 3(3,0) See R S 401.

SOC 404, 604 Sociological Theory 3(3,0) A survey of the development of sociological theory. Required of all Sociology majors. *Preq:* SOC 201 and Junior standing or consent of instructor.

SOC H408 Honors Thesis Research I 3 Reading and research related to the senior honors thesis. Completion of junior honors requirements and approval of department chair and thesis advisor required. *Preq:* SOC H303, H310, and honors status.

SOC H409 Honors Thesis Research II 3 Research and writing related to the senior honors thesis. *Preq:* SOC H408 and honors status.

SOC 430, 630 Sociology of Organizations 3(3,0) The analysis of administrative organizations and voluntary associations; applied analysis of their formal and informal group relations, communications, and effectiveness. *Preq:* SOC 201 and Junior standing or consent of instructor.

SOC 432 Sociology of Religion 3(3,0) A sociological analysis of religious systems and movements and their influence on other social institutions. *Preq:* SOC 201 and Junior standing or consent of instructor.

SOC 433, 633 Developing Societies 3(3,0) Examination of the social and historical causes of development and underdevelopment. Various sociological theories of development are reviewed. Selected countries are examined in an international context. *Preq:* SOC 201 and Junior standing or consent of instructor.

SOC 440, 640 Leisure, the Mass Media, and Culture 3(3,0) Production and consumption of leisure activities in contemporary society; popular culture, and the mass media as dominant leisure forms; social effects of leisure activities; relationship between work and leisure. *Preq:* SOC 201 and Junior standing or consent of instructor.

SOC 441, 641 Sociology of Sport 3(3,0) Sport as a social phenomenon; emphasis on leadership, discrimination, socialization, communication, conflict, and cooperation in sports; emerging social issues in contemporary sports. *Preq:* SOC 201 and Junior standing or consent of instructor.

SOC 460, 660 Race, Ethnicity, and Class 3(3,0) Investigation of sociological perspectives on race, ethnic relations, and social stratification. Analysis of the impact of social class on minority movements. (Not open to students who have taken SOC 431.) *Preq:* SOC 201 and Junior standing or consent of instructor.

SOC 461 Sex Roles 3(3,0) Female and male socialization; changes in statuses, roles, inequality, and opportunities in contemporary society, with cross-cultural and social class comparisons. *Preq:* SOC 201 and Junior standing or consent of instructor.

SOC 462, 662 Men, Masculinity and Society 3(3,0) Masculinity and social order: norms, roles, relationships and activities; identity and socialization: work, family, sexuality, war, sports, including subcultural comparisons. *Preq:* SOC 201 and Junior standing or consent of instructor.

SOC 463, 663 Sociology of Parenting 3(3,0) Sociology of parenting, child rearing, parenting

styles and outcomes; social change and parenting; variations by sex, race and class; cross-cultural comparisons; research-based, with applied orientation. *Preq:* SOC 201 and Junior standing.

SOC (R S) 471, H471, 671 Demography 3(3,0) See R S 471.

SOC 480, 680 Medical Sociology 3(3,0) Sociocultural factors in the etiology and treatment of physical illness; medical occupations and professions; the organization of health-care delivery systems. *Preq:* SOC 201 and Junior standing or consent of instructor.

SOC 481, 681 Aging and Death 3(3,0) Sociological orientation to aging populations focusing on the impact of health care, welfare, and retirement systems. Includes dying as a social phenomenon, suicide, euthanasia, and funerals. (Not open to students who have taken SOC 383.) *Preq:* SOC 201 and Junior standing or consent of instructor.

SOC 484, 684 Child Abuse and Treatment 3(3,0) Comprehensive examination of child abuse, neglect, and exploitation as major social problems; causes, effects, and prevalence of physical, sexual, and emotional maltreatment; definitional controversies; social policy and legal considerations; therapeutic approaches for children and their caretakers; child maltreatment and the judicial system. *Preq:* SOC 201 and Senior standing or consent of instructor.

SOC (R S) 495 Field Experience 3(1,8) Students participate in selected field placements under supervision for eight hours weekly and in a one-hour seminar per week. May be repeated once for credit. To be taken Pass/Fail only. *Preq:* SOC 380 or 390 and consent of department chair.

SOC (R S) 498 Independent Study 3(1,6) Individual readings or projects in sociological areas not covered in other courses. A written proposal approved by the instructor directing the work and by the department chair prior to registration. *Preq:* Consent of department chair.

SOC 499 Seminar in Selected Topics in Contemporary Sociology 3(3,0) Sociological areas of current interest will be explored. May be repeated by special arrangement for a maximum of six credits. *Preq:* Consent of department chair.

SOILS

Professors: R. E. Franklin, *Chair:* J. A. Martini, V. L. Quisenberry, B. R. Smith

See the following courses:

AGRON 202 Soils 4(3,2)
AGRON 403, 603 Soil Genesis and Classification 2(1,3)

AGRON 404, 604 Soils and Land Use 2(1,3)
AGRON 408, 608 Land Treatment of Wastewater and Sludges 3(3,0)

AGRON 446, 646 Soil Management 3(3,0)
AGRON 452, 652 Soil Fertility and Management 3(3,0)

AGRON 453, H453, 653 Soil Fertility Laboratory 1(0,3)
AGRON 475, H475, 675 Soil Physics and Chemistry 3(2,3)

AGRON 490, 690 Beneficial Soil Organisms in Plant Growth 3(3,0)

SPANISH

Professor: J. I. Suarez, S. E. Torres; *Associate Professors:* G. Bautista, P. R. Heusinkveld, S. C. King, *Chair, Assistant Professors:* C. R. Adams, C. L. Chavez, J. K. Hurley, C. Tisnado; *Instructors:* E. G. Combiar, I. C. Tapia; *Lecturer:* S. K. Harris; *Visiting Assistant Professor:* P. A. Wilson; *Visiting Instructors:* J. M. Sutherland, A. B. Walton

SPAN 101 Elementary Spanish 4(3,1) Course for students with no previous experience in Spanish study. The fundamentals of grammar and vocabulary are taught, and a foundation is provided for building oral and written proficiency. Three hours a week of classroom instruction and one hour a week in the language laboratory.

SPAN 102 Elementary Spanish 4(3,1) Continuation of SPAN 101.

SPAN 121 Accelerated Spanish I 8(6,2) Accelerated 8-credit course for students with two or more years of Spanish in high school. This course can be taken in lieu of SPAN 101 and SPAN 102. Through fundamental grammar, conversation, composition, and dictation, proficiency is stressed. May not be taken by students who have completed SPAN 101 or 102.

SPAN 151 Spanish for Graduate Students 3(3,0) Intensive program only for graduate students preparing for the reading examination in Spanish. A minimum grade of B on a final examination will satisfy graduate school foreign language requirement. May be repeated once. To be taken Pass/Fail only. *Preq:* Graduate standing.

SPAN 190 Study and Travel Abroad Preparation 1(1,0) Designed to prepare students for study/travel in Spanish-speaking countries. Students will be sensitized to cross-cultural differences and will be provided with practical skills and sources of information. Taught mainly in English. To be taken Pass/Fail only.

SPAN 201, H201 Intermediate Spanish 3(3,0) Intermediate course to practice listening, speaking, reading, and writing. Grammatical structures and basic vocabulary will be reviewed systematically. The course includes literary and cultural perspectives. *Preq:* SPAN 102, SPAN 121, or consent of department chair.

SPAN 202, H202 Intermediate Spanish 3(3,0) Continuation of SPAN 201. *Preq:* SPAN 201.

SPAN 221 Accelerated Spanish II 6(6,0) Accelerated intermediate course that can be taken in lieu of SPAN 201 and SPAN 202. Through conversation, composition, dictation, and intensive grammar review, proficiency is stressed. This course includes literary readings and cultural perspectives. May not be taken by students who have completed SPAN 201 or 202. *Preq:* SPAN 102, SPAN 121, or consent of department chair.

SPAN 299 Foreign Language Drama Laboratory 1(0,3) Participation in foreign language drama productions. No formal class meetings, but an average of three hours per week in a foreign language drama workshop for production. May be repeated for a total of three credits. *Preq:* Consent of instructor directing the play.

SPAN 301 Introduction to Hispanic Literary Forms 3(3,0) Introduction to the basic structures and elements of fiction, poetry, drama, and essay, including literary and critical theory, with readings in 19th and 20th century Spanish and Spanish-American literatures. *Preq:* SPAN 202.

SPAN 302 Intermediate Spanish Grammar and Composition 3(3,0) Intensive review of Spanish structure, verbs, idioms, and vocabulary with an introduction to syntax and stylistics through controlled and free composition. *Preq:* SPAN 202 or consent of department chair.

SPAN 303 Survey of Spanish Literature I 3(3,0) Literary movements, influences, and authors from the beginnings to the end of the 17th century. Representative works, discussions. *Preq:* SPAN 202 or consent of department chair.

SPAN 304 Survey of Spanish Literature II 3(3,0) Literary movements, influences, and authors from the 18th century to the present. *Preq:* SPAN 202 or consent of department chair.

SPAN 305 Intermediate Spanish Conversation and Composition I 3(3,0) Practice in spoken Spanish with emphasis on vocabulary, pronunciation, intonation, and comprehension. Written work to increase accuracy. Assignments in the language laboratory. *Preq:* SPAN 202 or consent of department chair.

SPAN 307 The Hispanic World: Spain 3(3,0) Introduction to the significant aspects of the culture of Spain from its origins to the present. Emphasis on the artistic, social, historical, political, and contemporary issues of the Iberian peninsula. *Preq:* SPAN 202 or consent of department chair.

SPAN 308 The Hispanic World: Latin America 3(3,0) Introduction to the significant aspects of the culture of Spanish-American countries. Emphasis will be placed on the development of the political, economical, geographical, social, and artistic aspects of Spanish America from the indigenous period to the present. *Preq:* SPAN 202 or consent of department chair.

SPAN 309 Introduction to Spanish Phonetics 3(3,0) Study of the basic concepts of phonetics and phonology, fundamental principles of Spanish pronunciation and International Phonetic Alphabet. *Preq:* SPAN 202 or consent of department chair.

SPAN 311 Survey of Spanish-American Literature 3(3,0) Literary movements, influences, authors, and works from the Colonial period to the present. *Preq:* SPAN 202 or consent of department chair.

SPAN 316 Spanish for International Trade I 3(3,0) Spoken and written Spanish common to the Hispanic world of business and industry, with emphasis on business practices and writing and translating business letters and professional reports. Cross-cultural references provide opportunity for comparative and contrastive analysis of American and Spanish cultural patterns in a business setting. *Preq or Coreq:* SPAN 202 and 305, or consent of department chair.

SPAN 398 Directed Reading 1-3(1-3,0) Directed study of selected topics in Spanish literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

SPAN 401 Twentieth Century Spanish Literature 3(3,0) Spanish literature from the Generation of 1898 to the present. Emphasis on the novel and theatre. *Preq:* SPAN 300-level literature course, or consent of department chair.

SPAN 403 Spanish American Women Writers 3(3,0) In-depth study of selected literary works written by Spanish American women. Representative authors are studied within their philosophical and socio-political contexts. *Preq:* Spanish 300-level literature course, or consent of department chair.

SPAN 405 Hispanic Non-fiction 3(3,0) Comparative and contrastive readings of journal articles, essays, biographies, travel accounts, and other contemporary non-fiction texts by Spanish and Spanish-American writers. *Preq:* 300-level literature, or culture course or consent of department chair.

SPAN 406 Hispanic Narrative Fiction 3(3,0) Topic-generated readings from Spanish American and/or Spain. Readings will consider gender issues, the family, ethnicity, religion, politics, history or socio-economic issues in the Hispanic world. *Preq:* Spanish 300-level literature, or culture course or consent of department chair.

SPAN 407 Hispanic Film 3(3,0) Films will be "read" as texts that mirror Hispanic society. Beside learning about cinematographic techniques in Spanish, topics will include comparative analysis of film and literature, film as propaganda, film as "blockbuster," and the cinematic depiction of social, cultural, and historical realities of Hispanic nations. *Preq:* Spanish 300-level language, literature, or culture course or consent of department chair.

SPAN 409 Advanced Grammar and Composition 3(3,0) Continuation of SPAN 302 with intensive study of syntax and stylistics through composition and translations. Practice in spoken Spanish. *Preq:* SPAN 302, Senior standing, or consent of department chair.

SPAN 411 Advanced Spanish Conversation and Composition 3(3,0) Continuation of SPAN 305 with emphasis on greater fluency and sophistication in oral and written expression. *Preq:* SPAN 305 or consent of department chair.

SPAN 412 Translation Theories and Techniques 3(3,0) Introduction to the theories and techniques of translations, using a variety of texts as a starting point for discussion of stylistic and grammatical difficulties. The course will be eminently practical, with student translations being systematically compared with professional translations. *Preq:* Spanish 300-level literature course or consent of department chair.

SPAN 416 Spanish for International Trade II 3(3,0) Study of the language and cultural environment of the Spanish-speaking markets of the world, including the linguistic and cultural idioms which support global marketing in general and the international marketing of textiles, agricultural products, and tourism in particular. *Preq:* SPAN 316.

SPAN 417 Professional Communication 3(3,0) A skill-oriented course, taught in a seminar format. Students will learn established "protocol" for addressing various Spanish speaking audiences and will learn to give professional presentations in Spanish. *Preq:* Spanish 300-level course or consent of department chair.

SPAN 422 The Contemporary Spanish-American Novel 3(3,0) New trends in the development of the Spanish-American novel from the 1940s to the present. *Prq:* Spanish 300-level literature course or consent of department chair.

SPAN 435 Contemporary Hispanic Culture 3(3,0) Study of social, political, economic, and artistic manifestations of contemporary Hispanic culture. *Prq:* Spanish 300-level civilization or culture course or consent of department chair.

SPAN 498 Independent Study 1-3(1-3,0-3,0) Directed study of selected topics in Spanish language, literature, and culture. *Prq:* Consent of department chair.

SPAN 499, 699 Spanish Literature, Language, and Culture 3(3,0) Selected topics and themes that have characterized Spanish literature, language, and culture throughout the centuries. May be repeated for a maximum of six credits. *Prq:* SPAN 303, 304, 311, or consent of department chair.

SPECIAL EDUCATION

Associate Professors: M. J. Emery, W. R. Fisk, Chair; *Assistant Professors:* M. T. Davis, J. P. Hodge, W. K. Parker, J. G. Shriner

ED SP 371 Characteristics of the Mildly Handicapped 3(3,0) This course will survey the characteristics which distinguish the mildly/moderately handicapped from the more severely handicapped. *Prq:* Minimum grade-point ratio of 2.0.

ED SP 402, H402, 602 The Exceptional Child 3(3,0) Survey of exceptionality including handicapped and gifted children; nature, cause and treatment of difficulties; educational problems. *Prq:* Minimum grade-point ratio of 2.0.

ED SP 413 Directed Teaching in Special Education 12(1,33) This comprehensive course provides a full-time, semester-long experience for potential special education teachers preparing to work with mildly/moderately handicapped students. It is generally the last course experience that allows practice under the supervision of master teachers. *Prq:* ED SP 371, 491, 492, 493, 494, 496.

ED SP (PRTM) 414, 614 Recreation and Leisure for Special Populations 3(3,0) See PRTM 414.

ED SP 416 Teaching Internship in Special Education 6(1,15) Full-time, supervised teaching internship in K-12 special education for one semester in cooperation with a participating South Carolina school. Reserved for students seeking certification in critical-need teaching areas. May be repeated for a maximum of 15 credits. To be taken Pass/Fail only. *Prq:* ED SP 371, 491, 492, 493, 494, 496. Application approved by the department.

ED SP 468 Early Intervention for Infants and Children with Special Needs 3(3,0) Intended to provide students with a working knowledge of the history of early intervention, legal precedence for providing early intervention services, and effective instructional techniques for working with infants and young children with disabilities and their families. *Prq:* ED SP 402, SOC 311.

ED SP 469, 669 Characteristics of Children with Emotional Handicaps 3(3,0) Intensive study of the meaning and concepts associated with emotionally handicapped. Analysis of the causes and characteristics of emotionally handicapped.

Prq: ED F 302 or PSYCH 201, ED SP 402, and a minimum grade-point ratio of 2.0, or consent of instructor.

ED SP 470, 670 Characteristics of Children with Learning Disabilities 3(3,0) Nature and extent of perceptual, motor, and conceptual impairments are examined. Team functions, community role, and family needs are emphasized. *Prq:* ED F 302, ED SP 402, PSYCH 201, minimum grade-point ratio of 2.0, or consent of instructor.

ED SP 472, 672 Psychology of Mental Retardation 3(3,0) Psychological aspects of mental retardation: learning, motivation, and personality development. *Prq:* Minimum grade-point ratio of 2.0.

ED SP 473, 673 Teaching the Mentally Retarded 3(3,0) Study, selection, and preparation of curricular materials, methods of teaching retarded children within the pre-adolescent and adolescent range. *Prq:* Minimum grade-point ratio of 2.0.

ED SP 474, 674 Educational Procedures for Children with Emotional Handicaps 3(3,0) Major problems of teaching disturbed children: curriculum and instructional modifications, program planning, facility adaptation, behavior controls, articulation with mental health specialists, and procedures to develop readiness for return to regular class. *Prq:* ED F 302, ED SP 402, PSYCH 201, minimum grade-point ratio of 2.0, or consent of instructor.

ED SP 475, 675 Educational Procedures for Children with Learning Disabilities 3(3,0) Special emphasis is given to educational evaluation and remedial procedures designed to improve the individual's learning abilities. A multisensory approach is emphasized geared to individual need. *Prq:* ED F 302, ED SP 402 and PSYCH 201; or consent of instructor.

ED SP 476, 676 Practicum in Learning Disabilities 3(2,3) Designed to provide practical experience in teaching the learning disabled under the supervision of college faculty and local teachers of learning disabilities. *Prq:* ED SP 402, 470, 475, minimum grade-point ratio of 2.0, or consent of instructor.

ED SP 477, 677 Characteristics of Children Who Are Gifted 3(3,0) Course designed to acquaint the student with definitions, incidences, characteristics, identification procedures, and curriculum options for the gifted. *Prq:* ED SP 402 and minimum grade-point ratio of 2.0.

ED SP 478, 678 Practicum in Emotionally Handicapped 3(2,3) Designed to provide practical experience in teaching the emotionally disturbed under the supervision of college faculty and local teachers of emotionally handicapped. *Prq:* ED SP 402, 469, 474, minimum grade-point ratio of 2.0; or consent of instructor.

ED SP 479, 679 Practicum in Mentally Retarded 3(2,3) Designed to provide practical experience in teaching the mentally retarded under the supervision of college faculty and local teachers of mentally retarded. *Prq:* ED SP 402, 472, 473, minimum grade-point ratio of 2.0, or consent of instructor.

ED SP 491 Assessment of the Mildly Handicapped 3(3,0) Course designed to prepare students to assess the mildly handicapped elementary/secondary student. The prospective teacher also will

be taught to implement other professional assessment techniques. *Prq:* ED SP 371; concurrent enrollment in ED SP 492, 493, 494, 496; and minimum grade-point ratio of 2.0.

ED SP 492 Academic Skill Intervention for the Handicapped 3(3,0) Course will prepare prospective special education teachers to develop and implement special education programs in areas of academic study for the mildly/moderately handicapped student. *Prq:* ED SP 371 or consent of instructor; concurrent enrollment in ED SP 491, 493, 494, 496; and minimum grade-point ratio of 2.0.

ED SP 493 Behavioral Skill Intervention for the Handicapped 3(3,0) Course will prepare prospective special education teachers to develop and implement special education programs in areas of behavioral intervention skills with the mildly/moderately handicapped. *Prq:* ED SP 371 or consent of instructor; concurrent enrollment in ED SP 491, 492, 494, 496; and minimum grade-point ratio of 2.0.

ED SP 494 Teaching Reading to the Exceptional Child 3(3,0) Course designed to teach the theory and skills necessary for success in teaching reading to exceptional students. Focus will be on the mildly/moderately handicapped student. *Prq:* ED SP 371, ED 461, 498, or consent of instructor; concurrent enrollment in ED SP 491, 492, 493, 496; and minimum grade-point ratio of 2.0.

ED SP 495 Role and Function of the Resource Teacher 3(3,0) Opportunities to study the role and function of successful special education resource teachers working with mildly/moderately handicapped students sharing similar learning styles. *Prq:* Concurrent enrollment in ED SP 413 and minimum grade-point ratio of 2.0.

ED SP 496 Special Education Field Experience 3(1,6) Course provides theory and extensive practice for potential special education teachers preparing for working with mildly/moderately handicapped students prior to the directed teaching experience. *Prq:* ED SP 371; concurrent enrollment in ED SP 491, 492, 493, 494; and minimum grade-point ratio of 2.0.

SPEECH

Associate Professor: D. S. Geddes, Chair; *Assistant Professors:* S. J. Madden, F. E. Marrus, J. M. Wise; *Instructors:* A. J. Hanson, C. A. Harding, M. B. Hovind, B. E. Schulz; *Lecturer:* E. R. Smith; *Visiting Assistant Professor:* L. J. Eastland; *Visiting Instructors:* J. W. Moss, S. M. Sparks

SPCH 150 Introduction to Speech Communication 3(3,0) [0,3] Provides students with an overview of theoretical approaches to the study of communication, including the theory and practice of interpersonal/small group/intercultural/public communication.

SPCH 162 Forensic Laboratory 1(0,3) Research, preparation, and practice leading to participation in on-campus and intercollegiate debate and individual events competition. May be repeated for a maximum of four credits.

SPCH 250 Public Speaking 3(3,0) [0,3] Practical instruction in public speaking; practice in the preparation, delivery, and criticism of short speeches. Course will develop an understanding and knowledge of the process of communication.

SPCH 251 Business and Professional Speaking 3(3,0) [O,3] Skills-intensive course for researching, organizing, and delivering speeches for business and professional settings.

SPCH (THEA) 268 Voice and Diction 3(2,3) Practical work to improve vocal clarity and tonal quality of the student's speech. Corrects such voice and diction problems as improper enunciation and extreme dialects.

SPCH 300 Communication in a World Context 3(3,0) An in-depth examination of differences in communication practices and meanings as seen through a global perspective. *Preq:* SPCH 150, 250, or consent of instructor.

SPCH 301 Speech Communication Theories 3(3,0) The various theories and models of communication that characterize the field of speech communication. Course focuses on how communication is conceptualized from different theoretical perspectives.

SPCH 330 Nonverbal Communication 3(3,0) Develops a knowledge of the functions of nonverbal behaviors in human interaction. This includes the study of gesture and movement, physical appearance, vocal behavior, immediacy, time and space, and intercultural differences. Promotes understanding of nonverbal rules.

SPCH 340 Negotiations Communication 3(3,0) Develops a knowledge of the basic strategies and elements of communication used in effective negotiation. This includes techniques of dealing with people, interests, options, and the criteria necessary in order to reach agreements and objectives.

SPCH 348 Interpersonal Communication 3(3,0) Survey of the theories and research in interpersonal communication with emphasis on the application of research findings and developmental strategies for intra- and inter-cultural relationships.

SPCH 350 Small Group and Team Communication 3(3,0) Examines the principles and skills involved in effective small-group communication.

SPCH 360 Persuasion 3(3,0) Theories of persuasion and propaganda. Practical instruction in analysis and construction of persuasive messages. *Preq:* SPCH 250.

SPCH 361 Argumentation and Debate 3(3,0) Basic principles of argumentation with emphasis on developing skills in argumentative speech. The role of the advocate in contemporary society with an emphasis on and an appreciation of formal debate. *Preq:* Consent of instructor.

SPCH 362 Organizational Communication Simulation 3(3,0) Designed to help students develop and apply communication skills which will be useful in a variety of organizational settings: taking and conducting interviews, group decision-making, and oral reporting. Discusses communication processes and provides personal and professional development. *Preq:* SPCH 250 or consent of instructor.

SPCH (THEA) 363 Oral Interpretation of Literature 3(3,0) Analysis and oral interpretation of selected poetry and prose; training in development of effective tone production.

SPCH 364 Organizational Communication 3(3,0) Examination of the process, theories, and techniques of communications within small groups and other organized bodies.

SPCH 365 Mass Communication: History and Criticism 3(3,0) A critical examination of mass communication in America, including discussions of history, theory, and current issues in television, film, popular music, telecommunications, and other media.

SPCH 366 Special Topics in Speech 3(3,0) Consideration of select major areas of study in speech. May be repeated with consent of department chair.

SPCH 369 Political Communication 3(3,0) Examination of American political rhetoric after 1900, focusing on such notable speakers as Franklin D. Roosevelt, John F. Kennedy, and Martin Luther King, Jr.

SPCH 390 Speech and Communication Studies Internship 3(0,9) Pre-planned, pre-approved, faculty supervised internship provides Speech and Communication Studies majors with field experience in areas related to their curriculum. May be repeated for a maximum of six credits. To be taken Pass/Fail only. *Preq:* Junior standing and consent of faculty advisor.

SPCH 455 Gender Communication 3(3,0) Course explores the ways communication behaviors and perceptions of communication behavior are affected by gender. The effects of gender on a variety of communication contexts are examined, including interpersonal, small group, organizational, and mass communication.

SPCH 460 Communication and Conflict Management 3(3,0) Introduces the study of communication practices in conflict situations within various personal and professional settings. Emphasis is on the central role of communication in the understanding and management of conflict. *Preq:* SPCH 150 or 250 or consent of instructor.

SPCH 464, 664 Advanced Organizational Communication 3(3,0) Application of speech communication methodology to the analysis of organizational communication processes. Students study methods of organizational communication analysis and intervention. *Preq:* SPCH 364 or consent of instructor.

SPCH 480 Intercultural Communication 3(3,0) Introduces the process of communication between and among individuals from different cultures or subcultures. Emphasis is on the effect of cultural practices within various communication relational contexts such as interpersonal, small group, and organizational communication. *Preq:* SPCH 150 or 250 or consent of instructor.

SPCH (ENGL) 491, 691 Classical Rhetoric 3(3,0) See ENGL 491.

SPCH (ENGL) 492, 692 Modern Rhetoric 3(3,0) See ENGL 492.

SPCH 499 Independent Study 1-3(1-3,0) Tutorial work for students with special interests or projects in speech communication outside the scope of existing courses. *Preq:* Consent of the department chair.

TECHNOLOGY AND HUMAN RESOURCE DEVELOPMENT

Professors: J. P. Crouch, C. H. Isbell, G. G. Lovedahl, *Chair:* D. H. Pate, Jr., D. G. Tesolowski, E. L. Weir, W. E. West; *Associate Professors:* B. V. Burkett, Jr., S. T. Ingram, C. D. Schmittou; *Assistant Professors:* J. M. Leining, C. C. Linnell, J. B. Simmons; *Instructor:* N. W. Leining; *Lecturers:* S. H. Edlein, C. D. Jones, F. C. Porcher, Jr.

THRD 110 Introduction to Industrial Technology 3(3,0) Examines the philosophy and structure of industrial technology education in the public school system and the philosophy and organization of human resource development in industry. Students are given an orientation to a major in industrial education and an overview of the principles of technology.

THRD 130 Woodworking I 2(1,3) Study of wood, its properties and the requisite skills necessary for understanding the use of wood in our technological way of life.

THRD 160 Training Programs in Industry 3(3,0) Introduction and first-hand experience in industrial training programs. Emphasis placed on observing and participating in actual training situations as well as communications and media usage in industry. *Preq:* THRD 110.

THRD 180 Introduction to Technical Drawing and Computer-Aided Drafting 3(1,6) Introductory drafting course utilizing traditional drafting techniques and computer software to explore technical drawing and orthographic projection through construction of multiview and isometric projections, sectional and auxiliary views, dimensioned working drawings, developments and intersections. Freehand sketching will be a means of problem solving and analysis.

THRD 181 Advanced Technical Drawing and Computer-Aided Drafting 3(1,6) Primary focus of course is to provide students with the opportunity to expand the application of computer-aided drafting in the areas of mechanical and architectural drawing. Emphasis will be on the development of complete working drawings incorporating instruction in the areas of production, manufacturing, and construction. *Preq:* THRD 110, 180 or equivalent, and consent of instructor.

THRD 220 Manufacturing Technology I: Systems 3(1,6) Introduction to management, personnel, and production systems studies through the creation of a corporation. Includes product identification, product research and design, selection of processes, plant design, production systems, and system enhancement. *Preq:* THRD 110 or consent of instructor.

THRD 222 Metal Processes 3(1,6) Material separating, forming and combining practices in the metals industries through the study of basic casting, welding, and sheet-metal techniques.

THRD 224 Machine Tool Processes 3(2,3) Basic practical shop experiences on the lathe, drill press, milling machine, and shaper. Benchwork, measuring tools, theory and demonstrations related to a survey of fundamental machining practices.

THRD 230 Construction Technology I: Materials 3(2,3) Course designed as an introduction to the commonly used building materials and methods of combining them in present day construction. *Preq:* THRD 110 or consent of instructor.

THRD 240 Power Technology I: Production 3(2,2) Study of power in terms of energy sources and the generation of power. Emphasis is placed on the development of insights and understandings of the scientific and operational principles involved in the production and utilization of power. *Preq:* THRD 110 or consent of instructor.

THRD 250 Electricity 3(2,3) Theory and application of DC and AC fundamentals, including instrumentation, power sources, circuit analysis, motors, construction wiring, and electronic principles and components.

THRD 280 Communications Technology I: Processes and Materials 3(2,3) Topics covered in the course include graphic communications, photography, computer application and use as a visual communication medium, and audio/video production and application.

THRD 281 Technical Airbrush Illustration 3(1,6) Course dealing with the technical application of airbrush technique. Methods of depicting objects on paper, photograph retouching, sandblasting glass, and fabric decoration are all dealt with, using a single-action airbrush.

THRD 310 Arts and Creativity for the Elementary Child 3(2,3) Provides the elementary and early childhood teacher with an opportunity to develop technological literacy, art/craft skills in a variety of media, and an understanding of their applications to the curriculum in a classroom environment. *Preq:* Junior or Senior standing in Early Childhood or Elementary Education programs or consent of instructor.

THRD (ED F) 315 Integrating Computers into the Classroom 1(0,2) See ED F 315.

THRD 320 Plastics and Plastic Processes 3(2,3) Introduction to thermoplastic materials, basic processing, fabricating, and finishing operations. Related careers and technological advances will also be studied.

THRD 360 Industrial Organizations and Safety 3(3,0) Study of the relationship of training and safety personnel to the kinds of tasks they are asked to perform in industrial situations. Emphasis is on safety knowledge development and on techniques which may be used in industrial safety training.

THRD 370 Motivation and Discipline in Vocational Education 3(3,0) Provides the classroom teacher and prospective teacher with knowledge and skills in the techniques of student discipline and motivation with application to the occupational education settings.

THRD 371 Management of Industrial Education Laboratories 3(2,2) Management and operation of unit and multiple-activity laboratories, including laboratory design, selection and procurement of tools and equipment, budgeting management, and coordination of activities in laboratory courses.

THRD 390 Industrial Cooperative Experience I 6(0,18) Full-time work experience program in industry. The course is offered during the summer only.

Students are requested to register with the instructor one semester prior to the summer in which they plan to enroll. *Preq:* Vocational-Technical Education option only.

THRD (G C) 410, 610 Selected Topics 1-3(1-3,0) Subject areas organized according to program needs. Content of the course will be planned cooperatively by the University and the school system or agency requesting the course. Course may be repeated for a maximum of 18 credits, but only if different topics are covered. *Preq:* Consent of instructor.

THRD 413, 613 Contemporary Technological Problems 3(3,0) Designed to provide students with an understanding of the problems and contributions of technology. Examples of these relationships will be taken from historical accounts and from analyses of contemporary technological intervention both in industrialized and nonindustrialized countries.

THRD 415, 615 History and Philosophy of Industrial and Vocational Education 3(3,0) Study of industrial and vocational education programs with the intent of developing a sound individual philosophy of industrial and vocational education. General topics covered: history; local, state, and federal legislation; types of vocational-technical programs; professional organizations; manpower utilization, vocational guidance, and training; industry, labor, and school relationships.

THRD 420, 620 Manufacturing Technology II: Materials and Processes 3(2,3) Continuation of THRD 202 with emphasis on materials and processes of manufacturing. Attention is given to specific materials separating, forming, and combining practices and equipment and on the competitive aspects of manufacturing. *Preq:* THRD 220 or consent of instructor.

THRD 430, 630 Construction Technology II: Practices and Systems 3(2,3) Study of industrial practices and systems affecting man, materials, and equipment associated with construction industries. Activities are directed toward developing a working knowledge of construction technology and a framework for incorporating this instruction into programs in the public and private sectors. *Preq:* THRD 230.

THRD 440, 640 Power Technology II: Transmission and Control Systems 3(2,3) Continuation of THRD 240. Provides instruction in transmitting and controlling power for utilization in such areas as manufacturing, communications, construction, and transportation. Introduces concepts of automation and robotics to enable the classroom teacher and industry personnel to gain necessary insights into this important area of technology. *Preq:* THRD 240.

THRD 441, 641 Internal Combustion Engines 3(2,3) Involves study of the internal combustion engine: theory of operation, applications, methods of analyzing performance, and troubleshooting malfunctions. The course is intended as an elective for Industrial Technology Education and Vocational-Technical Education option majors who desire proficiency in this essential area of industrial education. *Preq:* THRD 240 or consent of instructor.

THRD 450, 650 Electronics for Educators 3(1,6) Principles of electronics as applied in communications and automatic controls involving transistors, integrated circuits, and other electronic devices and materials for the preparation of teachers of industrial arts and vocational-technical electricity and electronics. *Preq:* THRD 250 or equivalent.

THRD 460, 660 Developing Training Programs for Industry 3(3,0) Study of the identification, selection, and organization of subject matter appropriate for industrial training programs. Emphasis is placed on analysis techniques, session and demonstration planning, written instructional materials development, trainee evaluation, and planning instructional schedules. *Preq:* Senior standing in Human Resource Development option or consent of instructor.

THRD 465, 665 Conducting and Evaluating Training Programs for Industry 3(3,0) Basic concepts of supervision, administration, and management of training programs. Emphasis on determining training requirements, planning, directing, and evaluating training programs. *Preq:* THRD 160, 460 or consent of instructor.

THRD 468, 668 Public Relations 3(3,0) This course emphasizes the techniques and methods of effective public and industrial relations which contribute to understanding and cooperation of labor, business, professional, educational, and industrial groups.

THRD 470, 670 Course Organization and Evaluation 3(3,0) Problems, techniques and procedures in the preparation, selection and organization of subject matter for instructional purposes. Methods, techniques, and preparation of materials used in the evaluation of student achievement in industrial education subjects.

THRD 471, 671 Teaching Industrial Subjects 3(3,0) Effective methods and techniques of teaching industrial subjects. Emphasis is given to class organization, preparation of lesson outlines, and audio-visual aids. *Preq:* ED F 335.

THRD 472 Advanced Instructional Methods 3(3,0) Designed to familiarize students with the various equipment, materials, and techniques associated with the delivery of instruction. Students will design, produce, and present materials to meet specific educational objectives. *Preq:* THRD 471 or one year of teaching experience.

THRD 473, 673 Competency Testing in Vocational Subjects 3(3,0) Study of competency testing in vocational education which includes educational objectives and measurement; construction and use of oral, objective, short answer, matching, essay, and performance tests; and treatment of test data for grade assignments and statistical analysis.

THRD 474, 674 School Safety 3(3,0) Study of the principles of school safety emphasizing safety analyses, accident prevention, remediation of unsafe conditions, development and use of instructional materials, and school liability.

THRD 477 Directed Teaching 12(0,36) Supervised observation and teaching in cooperation with selected public schools in which opportunities are provided for securing experience in teaching industrial subjects. *Preq:* THRD 371, 471, and grade-point ratio required for graduation.

THRD 478 Internship in Vocational Technical Education I (6,0,18) Supervised observation and teaching in cooperation with selected area vocational centers, high schools, and technical colleges to provide experience in teaching specified trades and industrial subjects. *Preq:* THRD 371 and consent of instructor.

THRD 479 Internship in Vocational Technical Education II (6,0,18) Continuation of THRD 478. *Preq:* THRD 478 and consent of instructor.

THRD (AG ED, ED F) 480, 680 Educational Applications of Microcomputers 3(2,2) See ED F 480.

THRD (AG ED, ED F) 482, 682 Advanced Educational Applications of Microcomputers 3(2,2) See ED F 482.

THRD 483, 683 Architectural Drafting for Industrial Education 3(1,6) Study of the major aspects of architectural drawing, such as plot, floor, and foundation plans; wall sections; and elevations. *Preq:* THRD 180.

THRD 484, 684 Communications Technology II: Systems 3(2,2) Continuation of THRD 204. Includes theory and operation of communications systems: telegraph, telephone, radio, television, satellites, sound/video recorders, lasers, and computers. Instruction on strategies for interpreting this area of technology to industry personnel and public school students is emphasized. *Preq:* THRD 280.

THRD 486, 686 Instructional Media Development 3(1,4) Basic instructional media development techniques are presented. Students will develop material using authoring software such as HyperCard, transparencies using Persuasion and/or PowerPoint, and fully storyboarded, scripted, and edited digital as well as analog video.

THRD 490 Industrial Cooperative Experience II (6,0,18) Continuation of THRD 390. *Preq:* Vocational/Technical Education option only.

THRD 491 Special Projects 3(3,0) The student is assigned a project in accordance with his needs and capabilities. Projects are either experimental, theoretical or developmental and cover subjects not thoroughly covered in other courses. Written project approval required before registering. *Preq:* Consent of instructor.

THRD 492, 692 Advanced Projects 1-6 The student gains depth in content by completing a project under the supervision of an instructor in one of the following subject areas: Arts and Crafts, Drawing and Design, Electricity and Electronics, Graphic Arts, Metalworking, Occupational Education, Power, and Woodworking. Written project approval required before registering. *Preq:* Consent of instructor.

TEXTILE CHEMISTRY

Professors: J. R. Aspland, H. M. Behery, M. J. Drews, B. C. Goswami, C. W. Jarvis, J. J. Porter, D. V. Rippey, *Director:* C. D. Rogers, E. A. Vaughn; *Associate Professors:* M. S. Ellison, R. V. Gregory, O. F. Hunter, Sr., G. C. Lickfield

T C 303 Textile Chemistry 3(3,0) Study of the properties and reactions of aliphatic and aromatic organic compounds. Emphasis will be placed on

mechanistic interpretations and the development of synthetic schemes leading to polyfunctional compounds of the types encountered in the textile industry. *Preq:* CH 102. *Coreq:* MTHSC 206 or 207.

T C 304 Textile Chemistry 3(3,0) Fundamental principles of physical chemistry with emphasis on areas frequently encountered in the textile industry including thermodynamics, kinetics and solution properties. These concepts will be applied to the study of organic compounds and organic reaction mechanisms. *Preq:* T C 303.

T C 305 Textile Chemistry Laboratory 1(0,3) Introduction to the techniques used in the synthesis and characterization of organic compounds. *Coreq:* T C 303.

T C 306 Textile Chemistry Laboratory 1(0,3) Techniques used in the measurement of the physicochemical properties of polymers and textile chemicals. *Coreq:* T C 304.

T C 315, H315, 615 Introduction to Polymer Science and Engineering 3(3,0) Chemistry of monomers and polymers and the chemical and physical properties of polymers are discussed emphasizing fiber forming, synthetic polymers. Includes molecular characterization, structure, morphology, and mechanical properties as they relate to the design of polymer systems for end uses in textiles, geotextiles, plastics and fiber-reinforced composite materials. *Preq:* CH 201 and 330 or 224, T C 304, or consent of instructor.

T C 316, 616 Chemical Preparation of Textiles 3(2,3) The chemicals used in the preparation of fabric for dyeing and finishing. Oxidizing and reducing agents and their control and effect on various fibers. Colloidal and surface active properties of various compounds and the fundamental factors influencing these properties.

T C 317 Polymer and Fiber Laboratory 1(0,3) High molecular weight polymers are prepared from monomers, and their chemical and physical properties are measured as functions of critical end use parameters using instrumental and physical methods. *Coreq:* T C 315.

T C 405 Principles of Textile Printing 3(2,3) The development of modern textile printing systems will be studied. In addition, the colloidal requirements of colorants, thickener compositions, rheology of printing pastes, and the various physical requirements necessary for a successful printing system in a modern plant will be examined. *Preq:* Consent of instructor.

T C 406 Textile Finishing—Theory and Practice 3(2,3) Study of the application of chemicals to textile substrates and how they affect the substrate's physical and chemical properties. The course emphasizes the theories of chemical modification of textiles as well as the technology of finishing.

T C 457, H457, 657 Dyeing and Finishing I 3(3,0) To understand the physical, chemical and mechanical principles behind the application of colors and finishes to textiles. This will require an appreciation of fiber chemistry and morphology, dye and finish structures and reactivity and the mechanical principles behind the equipment used to effect transfer of these chemicals onto the textile substrate.

T C 458, H458, 658 Dyeing and Finishing II 3(3,0) The kinetics and equilibria of dyeing processes. The use of conductivity, diffusion and other methods useful for measuring absorption of isotherms and dyeing rates and the general thermodynamic relationships applicable to dyeing operations. Fiber properties such as zeta potential, dye sites, relative amorphous area available will be included.

T C 459, 659 Dyeing and Finishing Laboratory I 1(0,3) Course will introduce the student to common dyeing and printing methods and to some of the machinery necessary to carry out dyeing operations. *Coreq:* T C 457.

T C 460 Dyeing and Finishing Laboratory II 1(0,3) Course will cover finishing in addition to dyeing operations and their instrumental control. *Coreq:* T C 458.

TEXTILE MANAGEMENT AND TEXTILE SCIENCE

Professors: J. R. Aspland, H. M. Behery, M. J. Drews, B. C. Goswami, C. W. Jarvis, J. J. Porter, D. V. Rippey, *Director:* C. D. Rogers, E. A. Vaughn; *Associate Professors:* M. S. Ellison, R. V. Gregory, O. F. Hunter, Sr., G. C. Lickfield

TEXT 175 Introduction to Textile Manufacturing 3(3,0) Introduction to the broad fields of textile, fiber, and polymer science and engineering with emphasis on the scientific, technological, and business principles utilized in producing fibers, yarns, and fabrics; enhancing fabric functionality by dyeing, finishing and printing; and establishing end-use products.

TEXT 176 Natural and Man-made Fibers 4(3,3) Concept of natural and synthetic polymers as the raw materials of the textile industry is introduced. A survey of the origin, characteristics, and processing properties of various natural fibers and fiber-forming synthetic polymers. Formation of textile fibers from polymeric materials will be presented with specific emphasis on the polymer science and engineering principles.

TEXT 201 Yarn Structures and Formation 4(3,3) Study of the fiber processing systems required to transform various fibrous materials into yarn. The course involves the machine principles and theories, relationship of the fibers to the process and the resultant yarn structures, and subsequent analysis of the yarn structure to define quality and to determine suitable manufacturing practices. *Preq:* TEXT 175 and 176 or consent of instructor.

TEXT 202 Fabric Structures, Design, and Analysis 4(3,3) Study of fabric formation techniques designed to explore the principles and theories of modern technology. Evaluation and analysis of weaving, knitting, and nonwoven fabrication of textile structures. *Preq:* TEXT 201 or consent of instructor.

TEXT 301 Fiber Processing I 3(2,2) Study of fibrous materials and their relationships to the fiber processing systems. The objectives, theories, principles, and mechanisms of the machines used in the earlier stages of fiber processing. The course is directed primarily to the staple fiber processing systems. Mechanical and mathematical fundamentals are applied to the machines concerned.

TEXT 302 Fiber Processing II 3(2,2) Continuation of TEXT 301 emphasizing the later stages of fiber processing for the ultimate yarn strand. *Preq:* TEXT 301.

TEXT 308 Apparel 4(3,3) Introduction to apparel construction techniques and analysis of problems commonly encountered in the apparel industry. Evaluation of fabric design and properties. *Preq:* TEXT 202 or consent of instructor.

TEXT 311 Fabric Development I 3(2,2) Study of the basic theory of the cam loom weaving machine. The principles of designs of the basic plain, twill, and sateen fabric, and other weaves such as the honeycomb, the mock leno, and the huckaback weave. Weave analysis and preparation of necessary drafts are included.

TEXT 312 Fabric Development II 3(2,2) Study of the theory and operation of the dobby head, Knowles head, Staubli dobby, Jacquard head, and multicolor selection for the above looms. Weave design for compound fabrics using two or more systems of warp and filling threads for three-dimensional weaves, weave analysis, and preparation of drafts are covered. *Preq:* TEXT 311.

TEXT 314 Chemical Processing of Textiles 4(3,2) Concepts of current procedures in the chemical, mechanical and physical preparation, and in bleaching, dyeing, printing and finishing of fabrics are presented; colorimetric and spectrophotometric methods of color control and test methods for the evaluation of the effectiveness of the treatments are emphasized. Not open to Textile Chemistry or Textile Management (Chemical) majors.

TEXT 321, H321, 621 Fiber Science 3(2,2) The student will become familiar with the physical properties of textile and high performance fibers, and how these properties influence process and end-use performance; method of measuring those properties; and how those properties are related to structural features of the fiber.

TEXT 322, 622 Properties of Textile Structures 3(2,2) Yarn and fabric properties, their scientific significance and analysis. Dimensional, structural, and mechanical interrelationships are established and evaluated.

TEXT 324 Textile Statistics 3(3,0) Introduction to statistics with particular application to the textile industry. Measures of central value and variation, probability, the normal curve, tests of hypotheses, elementary correlation and regression. *Preq:* Sophomore standing or consent of instructor.

TEXT 333 The Textile Arts 3(2,3) Survey of the development of the hand loom from prehistoric times to the present. Studio work in the elements of handwoven fabrics, their design, analysis and production of four-harness counterbalance and jack looms. *Preq:* Junior standing or consent of instructor.

TEXT 403, 603 Fiber Processing III 3(2,2) Concepts of current fiber processing machines, techniques, practices, and their validity are investigated. Problems are assigned that require use of acquired knowledge, textile testing equipment, and processing machines. The relation of fibrous material properties and processing dynamics to the fiber assemblies produced is studied. *Preq:* TEXT 201 or 302.

TEXT 411, 611 Fabric Development III 3(2,2) Study of specifications and loom details for the production of fabrics woven to the customer's order, including multicolor layouts. Warp and filling preparation are covered as well as size formulations and their methods of application. Warping and dressing plans are developed for the warper and the slasher. *Preq:* TEXT 202 or 312.

TEXT 414 Knitted Structures 3(3,0) Survey of knitted structures dealing with the principles and mechanisms involved. Various systems are covered with emphasis on fiber and yarn requirements and fabric properties.

TEXT 416 Nonwoven Structures 3(2,2) Nonwoven fabric structures, their manufacture, properties, and applications. Methods of nonwoven fabric formation, resultant material characteristics and end-use applications are examined. *Preq:* TEXT 201 or 301.

TEXT 420 Advanced Computer Applications in Textiles 3(3,0) Advanced study of the use of computers as professional support devices for textile management, research, and manufacturing, decision making. *Preq:* CP SC 120 or consent of instructor.

TEXT 426, 626 Instrumentation 3(3,0) The principles of industrial and process instrumentation and control as applied in the textile industry. Static and dynamic characteristics of measurement devices. Transducer principles and techniques of their application for measurement of physical properties such as pressure, temperature, flow, weight, etc. Principles of process controllers. Applications of computers in textile process control.

TEXT 428 Textile Research 1-3 Investigation of a problem in textile, fiber, or polymer science under the direct supervision of a faculty member. After completing the research, the student prepares a formal written report which is presented orally. *Preq:* Senior standing or consent of instructor.

TEXT 429 Textile Research 1-3 Continuation of TEXT 428.

TEXT 440, 640 Color Science 3(2,3) Application of the science of color to industrial practice in textiles, plastics, paints, lighting, and ceramics. Laboratory work will be performed on modern instruments and computers.

TEXT 460, 660 Textile Processes 3(3,0) Survey of machinery and processes of textile manufacturing from fiber formation through fabric finishing. For students with a nontextile background.

TEXT 470 Textile Costing and Inventory Control 3(3,0) Study of the principles of costing as they specifically apply to the manufacture of textiles. Allocation of cost of material, labor, and overhead; determining the unit cost of yarns, fabrics, and finishes. Inventory systems, storage, materials handling and profiles. *Preq:* TEXT 202 or consent of instructor.

TEXT 471 Plant Layout and Processing Design 3(3,0) Survey of the essentials necessary for textile process implementation from the pilot plant concept to a functioning textile process facility. Consideration will be given to material flow requirements, power requirements, machinery layout, environmental controls, and facility design. *Preq:* TEXT 202.

TEXT 472, 672 Textile International Trade 3(3,0) The course will analyze the current structure of the international textile trade including imports, exports, tariffs and trade requirements. Field experience with local firms will be used to enhance the student's understanding. *Preq:* Senior standing or consent of instructor.

TEXT 475, 675 Textile Marketing 3(3,0) Examination of the activities involved in the distribution of textile products in today's market. Emphasis will be placed on the role of consumer research and the analysis of fashion in the design and promotion of textile products.

TEXT 476, 676 Carpet Manufacturing 3(3,0) Study of the materials, manufacturing technologies, products, and practices associated with the carpet manufacturing sector of the textile industry. Raw materials, product design, formation and finishing systems, evaluation methods, distribution and end-use applications are examined. *Preq:* TEXT 201, 202, or consent of instructor.

THEATRE

Professors: C. S. M. Egan, *Chair*; R. C. Sawyer, *Associate Professor*; D. J. Hartmann, *Assistant Professors*; W. L. Overly, R. P. Thomason; *Visiting Assistant Professor:* C. A. Collins, *Research Associate*

THEA 210, H210 Theatre Appreciation 3(3,0) Examination of the theatre event approached through historical context, play reading, analysis of production practices, and field trips to live dramatic performances.

THEA 267 Stage Makeup Techniques 3(2,1) Designed as a practical study of basic stage makeup techniques for the acting student including corrective makeup, modeling with paint, three-dimensional makeup, prosthesis with latex, and makeup for other media.

THEA (SPCH) 268 Voice and Diction 3(2,3) See SPCH 268.

THEA 274 Stage Movement for Actors 3(1,2) Study of the psychological and physical sources of movement in the human body, with emphasis on the attainment of intellectual and physical control and the application of the skills to the development of a role.

THEA 275 Acting I 3(2,3) Fundamentals of acting, basic stage techniques; exercises in interpretation, improvisation, characterization; experience in supervised scene study.

THEA 279 Theatre Laboratory I(0,3) Practical work in theatre on a production designed for public presentation. May be repeated for a maximum of four credits.

THEA 315 Theatre History I 3(3,0) Historical survey of Western theatre; emphasis will be placed on the changing roles of the playwright, director, actor, technician, and spectator from antiquity to the Renaissance. *Preq:* Sophomore standing.

THEA 316 Theatre History II 3(3,0) Historical survey of Western theatre; emphasis will be placed on the changing roles of the playwright, director, actor, technician, and spectator from the Renaissance to the present. *Preq:* Sophomore standing.

THEA 317 African American Theatre 3(3,0) Designed to acquaint the student with the origin and development of African American playwrights, plays, players, and their contributions to the American theatre from the 19th century to the present.

THEA (ENGL) 347 The Structure of Drama 3(3,0) Introduction to the creative writing and critical study of drama. *Preq:* Sophomore literature or consent of instructor.

THEA (SPCH) 363 Oral Interpretation of Literature 3(3,0) See SPCH 363.

THEA 368 Voice for the Stage 3(2,3) Study of the principles of vocal production and standard American speech for the stage; exercises in breath support and projection, improving tonal quality and elimination of regional dialects through the study of the International Phonetic Alphabet. *Preq:* Sophomore standing.

THEA 372 Creative Drama 3(3,0) Provides practical applications using creative drama as a learning tool to strengthen curriculum goals and heighten student participation in the classroom. Students will develop classroom teaching strategies based on drama education. Appropriate for elementary and secondary teachers, artists, and workshop leaders.

THEA 375 Acting II 3(2,3) Continued study in the craft of acting for contemporary Western theatre. Students will focus on monologue and scene study in a variety of performance settings. *Preq:* THEA 275 or consent of instructor.

THEA 376 Stage Directing I 3(2,3) Directing and staging techniques for the proscenium stage; exercises in composition, movement, picturization; experience in direction of scenes. *Preq:* Sophomore standing.

THEA 377 Stagecraft 3(2,3) Theory and practice of stage design and technology. *Preq:* Sophomore standing.

THEA 379 Acting Ensemble 1(0,3) Designed to provide performance opportunities in the area of theatre for young audiences. The student will be a member of a theatrical touring troupe and perform in a variety of spaces and locations. May be repeated for a maximum of four credits. By audition only.

THEA 387 Stage Lighting 3(2,1) Theory and practice of stage lighting through an understanding of various lighting instruments, lighting control systems, and execution of lighting designs.

THEA 397 Scene Painting 3(2,1) Practical study of basic painting techniques for the theatre including layout, proper use of materials, painting styles, and texturing techniques. *Preq:* THEA 377.

THEA 398 Special Topics in Theatre 3(3,0) Select areas of study in theatre not addressed by other theatre course offerings. May be repeated once. *Preq:* Consent of instructor.

THEA (ENGL) 447 Playwriting Workshop 3(0,3) Workshop in the creative writing of plays. *Preq:* THEA (ENGL) 347.

THEA 472, 672 Improvisation: Interpreting and Developing Texts 3(3,0) Provides practical applications using drama as a learning tool to strengthen writing skills, motivate collaboration, heighten analytical skills. Students will use improvisation to analyze texts and to revise original work, consider theory and research of contempo-

rary scholars, and develop approaches to literature and composition based on readings and drama experiences. *Preq:* Senior standing or consent of instructor.

THEA 475 Acting III 3(2,3) Study and practice of acting styles and techniques, including those for period plays, musicals, and nonproscenium contemporary forms. *Preq:* THEA 375.

THEA 476 Stage Directing II 3(2,3) Continued study in the art of stage directing, emphasizing leading contemporary theory and methodology. Course will culminate in the production of a one-act play for public presentation. *Preq:* THEA 376 or consent of instructor.

THEA 477 Stage Design 3(2,3) Study and practice in stage design, including drafting, graphics, drawing, rendering, scene painting, and light plotting. *Preq:* THEA 377 or consent of instructor.

THEA 499, 699 Independent Studies 1-3(1-3,0) Tutorial work for students with special interests in theatre study outside the scope of existing courses. *Preq:* Consent of department chair.

WILDLIFE AND FISHERIES BIOLOGY

Professors: A. G. Eversole, T. T. Fendley, J. W. Foltz, T. E. Lacher, Jr., D. L. Otis, D. L. Robinette, T. E. Schwedler, J. R. Sweeney, *Chair:* J. R. Tomasso, Jr., G. W. Wood; *Associate Professor:* J. J. Isely

WFB 101 Introduction to Aquaculture, Fisheries and Wildlife 1(1,0) Informative sketch of aquaculture, fisheries science, and wildlife management. Students are introduced to principles, resources, professional organizations, and careers in these fields. *Preq:* Major in Wildlife and Fisheries Biology or consent of instructor.

WFB 102 Methods of Aquaculture, Fisheries and Wildlife Biology 1(0,2) Introduction to methodology used in aquaculture, fisheries science and wildlife management. Students are introduced to terminology, techniques, laws and legislations. Skills with dimensions, units, computations and technical communications as applied to aquaculture, fisheries and wildlife. Open only to Aquaculture, Fisheries and Wildlife majors. *Coreq:* WFB 101.

WFB 306 Introduction to Wildlife Conservation 2(2,0) Examines the fundamental thinking upon which modern conservation programs have been built.

WFB 307 Hunting and Wildlife Management 1(1,0) Hunting techniques used to harvest renewable wildlife resources are examined with respect to their roles in sound management practices. The effects of selected hunting regulations on wild populations, safety, and ethics are discussed. *Preq:* Junior standing or consent of instructor.

WFB (BIOSC) 313 Conservation Biology 3(3,0) Study of the biological bases for the conservation of flora, fauna, and habitats. Biological factors that influence decision-making process will also be addressed. *Preq:* One year of general biology or consent of instructor.

WFB 350 Principles of Fish and Wildlife Biology 3(3,0) Introduction to principles of fisheries and wildlife biology on which sound management

practices are based. Interrelationships of vertebrate and invertebrate biology, habitat, and population dynamics will be covered. *Preq:* One year of general biology.

WFB 412, H412, 612 Wildlife Management 3(2,3) Basic principles and general practices of wildlife management and conservation will be covered. Major problems concerning the management of wildlife resources, with emphasis on upland game species. Laboratory work includes practical work on the Clemson University woodlands and field trips to several areas where wildlife management is being practiced.

WFB 414, 614 Wildlife Nutritional Ecology 3(3,0) Concepts of how terrestrial wildlife obtains and utilizes energy and nutrients in wild ecosystems will be taught. Energy and nutrient availability will be discussed in the ecological context of distribution, flow and cycling in natural and modified foraging areas. Physiology of digestion will be discussed for major homeotherms. *Preq:* FOR 415 or WFB 412.

WFB 416, 616 Fishery Biology 3(2,3) Principles underlying freshwater fish production. Introduction to major groups of freshwater fishes and their habitats. Topics include identification, age and growth, fecundity, food habits, populations estimation, environmental evaluation, management practices, and fish culture. *Preq:* One year of introductory biology and Junior standing.

WFB 430, 630 Wildlife Conservation Policy 3(3,0) This course deals with the ecological rationale and management implications of public policy designed for the conservation of American wildlife resources. Emphasis is on managed-land issues. *Preq:* WFB 350 or permission of the instructor.

WFB 450, 650 Aquaculture 3(3,0) Basic aquacultural techniques applied to freshwater and marine organisms; past and present culture of finfishes and shellfishes around the world; principles underlying fish production; water quality, feeding, and nutrition as they influence production of cultured aquatic organisms. *Preq:* One year of general biology and Junior standing.

WFB 451, 651 Fish Hatchery Management 3(3,0) Principles of fish hatchery management including hatchery design, water-quality management, fish-health monitoring, fry and fingerling production, genetics, and transport techniques. Hatchery management techniques for sport-fish enhancement and endangered species recovery programs will be emphasized. *Preq:* One year of general chemistry and one year of general biology.

WFB 452 Fish Physiology 4(3,3) Course will acquaint fisheries biologists and aquaculturists with the physiology of fish. Nutrition, bioenergetics, reproduction, and water and ion balance as they relate to fish culture and fisheries management will be emphasized. *Preq:* One year of general biology, one year of general chemistry, and AN PH 301 or consent of instructor.

WFB 460, 660 Warmwater Fish Diseases 2(2,0) Study of diseases in warmwater fish including infectious and noninfectious processes. *Preq:* One year of general biology, Junior standing and consent of instructor.

W F B 462, H462, 662 Wetland Wildlife Biology 3(3,0)F Study of wetland wildlife habitats, emphasizing classification by physical, chemical, and biological characteristics; the importance of wetland habitat for management and production of wetland wildlife species. *Preq:* BIOL 103 and 104; or 110/111.

W F B 463 Directed Research in Aquaculture, Fisheries and Wildlife Biology 1(0,3)F, S Research problems in selected areas of aquacultural, fisheries, or wildlife science to introduce the student to experimental design, research techniques, and presentation of research results. May be repeated for a maximum of three credits. *Preq:* Junior standing and consent of instructor.

W F B (ENT) 469, H469, 669 Aquatic Insects 3(1,6) See ENT 469.

W F B 490 Field Training in Aquaculture, Fisheries, and Wildlife 6(0,18)F, S The student, in an eight-to-ten week program, has the opportunity to observe aquaculture, fisheries, or wildlife management. Student will have supervised management responsibility. Total of 270 hours required. Must be prearranged at least two months in advance. To be taken Pass/Fail only. *Preq:* Senior standing in Fisheries and Wildlife Biology and consent of instructor.

W F B 493 Selected Topics 1-4(1-4,0)F, S Specialized topics which explore current areas of research and management in either aquaculture, fisheries science, or wildlife management are examined in a lecture/seminar format. May be repeated for credit. *Preq:* Junior standing and consent of instructor.

W F B 499 Wildlife Biology and Fisheries Seminar 1(1,0)F, S An exploration of current literature and research in fisheries and wildlife sciences. Students will participate in the analysis of research findings, utilizing skills acquired in their undergraduate programs. May be repeated once for credit.

WOMEN'S STUDIES

Associate Professors: B. Daniell, J. M. Melton;
Assistant Professor: S. M. Sinke, E. K. Sparks

W S 301 Introduction to Women's Studies: Women's Lives 3(3,0) This interdisciplinary course explores the unique features of women's lives from childhood to old age. Course content is based on new research in many disciplines, including psychology, sociology, history, literature and the arts. *Preq:* Sophomore standing.

W S 498 Advanced Studies in Women's Studies 3(3,0) Focuses on the theoretical foundations for women's studies, with particular emphasis on how women's studies research and theory influence institutions and governmental policies. Readings include essays on such central women's studies issues as work, family, children, health care, legislation, and government policies. *Preq:* W S 301 or consent of instructor.

ZOOLOGY

ZOOL 462, 662 Herpetology 3(2,3) Systematics, life history, distribution, ecology, and current literature of amphibians and reptiles. Laboratory study of morphology and identification of world families, and U.S. genera, as well as all southeastern species. Field trips will be required. *Preq:* BIOSC 303 or consent of instructor.

ZOOL 463, 663 Ichthyology 3(2,3) Systematics, life history, distribution, ecology, and current literature of fish. Laboratory study of morphology and identification of U.S. genera, as well as all southeastern species. Field trips will be required. *Preq:* BIOSC 303 or consent of instructor.

ZOOL 465, 665 Ornithology 4(3,3) The biology of birds: their origin and diversification, adaptations, phylogeny, classification, structure and function, behavior, ecology, and biogeography. Field identification is emphasized and field trips are required. *Preq:* BIOSC 303 or consent of instructor.

ZOOL 493 Undergraduate Seminar 1(1,0) Exploration of current zoological literature. *Preq:* Senior standing.

FACULTY

- Abalo, Kokou Yano**, Visiting Assistant Professor of Mathematical Sciences. MS, Kharkov State University (former Soviet Ukraine), 1981; MS, University of Illinois at Urbana-Champaign, 1988; PhD, Clemson University, 1994
- Abbott, Albert Glenn**, Associate Professor of Biochemistry. BS, University of Connecticut, 1976; PhD, Brown University, 1980
- Abramovitch, Rudolph Abraham**, Professor of Chemistry. BS, Alexandria University, 1950; PhD, King's College, 1953; DSc, University of London, 1964
- Acorn, John Thomson**, Chair and Professor of Art. BA, Montclair State College, 1959; MFA, Cranbrook Academy of Art, 1961
- Acton, James Crockett**, Chair and Professor of Food Science. BS, 1965, PhD, 1970, University of Georgia
- Adams, Clementina Rodriguez**, Assistant Professor of Spanish. BA, Atlantico University (Colombia), 1969; MS, 1974, PhD, 1984, Florida State University
- Adams, Craig David**, Associate Professor of Environmental Systems Engineering. BS, 1983, MS, 1988, PhD, 1991, University of Kansas
- Adams, Minerva Rios**, Lecturer in Mathematical Sciences. BS, University of Puerto Rico, 1978; MS, Virginia Polytechnic Institute and State University, 1982
- Adams, Warren Philip**, Associate Professor of Mathematical Sciences. BS, Lewis University, 1979; MS, 1981, PhD, 1984, Virginia Polytechnic Institute and State University
- Addison, Clarence Lee Benjamin**, Professor of Construction Science. BA, Howard University, 1959; MArch, Clemson University, 1974
- Adelberg, Jeffrey William**, Assistant Professor/Research Associate of Horticulture. BS, 1982, MS, 1987, Rutgers University, PhD, Clemson University, 1993
- Adler, Peter Holdridge**, Professor of Entomology. BS, Washington and Lee University, 1976; MS, 1979, PhD, 1983, Pennsylvania State University
- Ahzi, Said**, Assistant Professor of Mechanical Engineering. BS, 1983, MS, 1984, PhD, 1987, University of Metz (France)
- Aitken, James Bruce**, Professor of Horticulture. Sandhill Research and Education Center. BS, 1962, MS, 1964, Clemson University; PhD, University of Florida, 1967
- Alberts, James Joseph**, Adjunct Professor of Zoology. BA, Cornell College, 1965; MS, Dartmouth College, 1967; PhD, Florida State University, 1970
- Albrecht, John Ernest**, Professor of Animal Science. Pee Dee Research and Education Center. BS, Delaware Valley College, 1965; MS, 1968, PhD, 1971, North Carolina State University
- Alexander, John Calvin, Jr.**, Assistant Professor of Finance. BBA, 1984, MBA, 1985 Stetson University; PhD, Florida State University, 1991
- Allen, Benjamin Louis, Jr.**, Biomedical Professor; Chief of Staff, Greenville Unit, Greenville Hospital System. BS, Wofford College, 1960; MD, Duke University, 1964
- Allen, Lawrence Robert**, Chair and Professor of Parks, Recreation and Tourism Management. BS, West Chester State University, 1970; MS, 1974, PhD, 1979, University of Maryland
- Allen, William Harold**, Professor of Agricultural and Biological Engineering. BS, 1966, MS, 1969, Clemson University; PhD, University of Tennessee, 1972; PE
- Alley, Thomas Robertson**, Professor of Psychology. BA, BS, Pennsylvania State University, 1975; MA, 1979, PhD, 1981, University of Connecticut
- Allison, David John**, Associate Professor of Architecture. BS, 1978, MArch, 1982, Clemson University
- Almodovar, Robert T.**, Visiting Assistant Professor. BS, 1980, MArch, 1982, Clemson University
- Alonso, Stephanie**, Visiting Assistant Professor of Architectural Studies. BS, University of Florida, 1989; MS, Clemson University, 1993
- Alphin, John Gilbert**, Professor of Agricultural and Biological Engineering. Pee Dee Research and Education Center. BS, 1960, MS, 1962, PhD, 1965, North Carolina State University
- Alverson, David Roy**, Professor of Entomology. BS, 1968, MS, 1976, Clemson University; PhD, University of Georgia, 1979
- Amirkhanian, Serjil**, Associate Professor of Civil Engineering. BS, 1979, MS, 1981, Tennessee Technological University; PhD, Clemson University, 1987
- Anand, Subhash Chandra**, Professor of Civil Engineering. BS, Banaras Hindu University (India), 1955; MS, 1965, PhD, 1968, Northwestern University; PE
- Anand, Vera Barata**, Professor of Engineering Graphics. BS, University of Para (Brazil), 1961; MS, Northwestern University, 1966
- Anderson, Vicki Truluck**, Adjunct Assistant Professor of Medical Technology. McLeod Regional Medical Center. BS, University of Tampa, 1972
- Andreas, James Robert**, Professor of English. BA, Northwestern University, 1965; MA, The Johns Hopkins University, 1966; PhD, Vanderbilt University, 1973
- Applying, Jeffrey Robert**, Associate Professor of Chemistry. BS, 1980, PhD, 1985, Georgia Institute of Technology
- Arbena, Joseph Luther**, Professor of History. BA, George Washington University, 1961; PhD, University of Virginia, 1970
- Arnett, James D.**, Adjunct Professor of Plant Pathology and Physiology. BS, 1964, MS, 1966, University of South Carolina; PhD, Clemson University, 1971
- Arnold, Edwin Pratte**, Associate Professor of German. BA, University of South Carolina, 1958; MA, Kent State University, 1968
- Askew, George Robert, Jr.**, Professor of Forest Resources; Director of Belle W. Baruch Forest Science Institute. BS, 1976, MS, 1978, PhD, 1981, Clemson University
- Aspland, John Richard**, Professor of Textiles. BS, 1958, MS, 1960, Leeds University; PhD, Manchester University, 1964
- Astle, Deana Lee**, Assistant Dean of Libraries; Librarian. BA, Brown University, 1967; MLS, University of California, 1968; MA, University of Utah, 1976
- Autuore, Julie**, Assistant Professor of Mathematical Sciences. BS, University of Connecticut, 1985; MA, 1988, PhD, 1990, University of California
- Aziz, Nadim Mahmoud**, Professor of Civil Engineering. BSCE, 1978, MS, 1980, PhD, 1984, University of Mississippi
- Babel, Deborah Byrne**, Department Head of Libraries; Associate Librarian. BA, Wells College, 1968; MLS, University of North Carolina, 1976; MBA, Western Washington University, 1989
- Backman, Kenneth Frank**, Adjunct Assistant Professor of Parks, Recreation and Tourism Management. BS, Acadia University (Canada), 1980; MUP, 1985, PhD, 1989, Texas A&M University
- Backman, Sheila Jane**, Associate Professor of Parks, Recreation and Tourism Management. BSC, 1977, MR, 1979, Acadia University (Canada); PhD, Texas A&M University, 1988
- Badr, Abdel Wahed**, Adjunct Assistant Professor of Agricultural and Biological Engineering. BS, Alexandria University (Egypt), 1968; MS, 1978; PhD, North Carolina State University, 1983
- Bagby, Sara Ayers**, Professor of Home Economics. BS, Georgia College, 1954; MS, 1957, PhD, 1974, University of Georgia
- Bagchi, Amit**, Assistant Professor of Mechanical Engineering. B.Tech, Indian Institute of Technology (Kharagpur), 1975; MScE, University of New Brunswick (Canada), 1977; PhD, Carnegie-Mellon University, 1983
- Bailey, John Michael**, Instructor of English. BA, 1992, BA, MA, 1994, Clemson University
- Baillie, Eugene E.**, Adjunct Professor of Biochemistry/Medical Technology. BS, University of Nebraska, 1963; MD, University of Nebraska College of Medicine, 1967
- Balnbridge, Robert Warin**, Visiting Assistant Professor of Planning and Landscape Architecture. BArch, University of California (Berkeley), 1970; MArch, Rice University, 1978
- Baird, William Vance**, Associate Professor of Horticulture. BS, Oregon State University, 1976; MA, Miami University, 1979; PhD, University of Virginia, 1983
- Balakrishnan, Nagraj**, Assistant Professor of Management. BE, University of Madras, 1981; MS, University of Kentucky, 1983; PhD, Purdue University, 1987
- Balch, Clarence Almus**, Lecturer in Engineering Graphics. BS, California Polytechnic State University, 1959
- Ballard, Robert Edward**, Professor of Botany. BS, 1966, MA, 1968, Miami University; PhD, University of Iowa, 1975
- Barbary, Shelley White**, Assistant Professor of Curriculum and Instruction. BS, 1968, PhD, 1974, Clemson University
- Barfield, Susan Ferguson**, Professor of Food Science and Microbiology. BS, 1971, MS, 1979, PhD, 1985, North Carolina State University
- Barfield, Rayford Elliott, Jr.**, Associate Professor of English. BA, LaGrange College, 1961; MA, University of Georgia, 1963; PhD, University of Tennessee, 1969
- Barger, Jefferson Davis III**, Adjunct Assistant Professor of Agricultural and Biological Engineering. BS, North Georgia College, 1969; MS, 1972, PhD, 1989, Clemson University
- Barker, James Frazier**, Dean, College of Architecture, Arts and Humanities; Professor of Architecture. BArch, Clemson University, 1970; MArch, Washington University, 1973; AIA
- Barkley, David Lane**, Professor of Agricultural and Applied Economics. BA, Furman University, 1969; MA, University of Georgia, 1972; PhD, Iowa State University, 1976
- Barlow, Deborah Lynn**, Head Gunnin Architectural Library; Assistant Librarian. BFA, Miami University, 1981; MA, University of Cincinnati, 1986; MLS, Indiana University, 1990
- Barmore, Charles Rice**, Adjunct Professor of Food Science and Packaging Science. BS, Clemson University, 1966; MS, 1969, PhD, 1972, University of Florida
- Barnhart, Scott Wesley**, Associate Professor of Finance. BS, 1978, MS, 1980, Florida State University; PhD, Texas A&M University, 1984
- Baron, William**, Associate Professor of Civil Engineering. BSCE, City College of New York, 1960; MSCE, 1963, PhD, 1966, Purdue University; PE
- Barrett, David Elm**, Professor of Educational Foundations. BA, Wesleyan University, 1969; MS, 1973, PhD, 1974, University of Southern California
- Barron, Charles Henson, Jr.**, Professor of Chemical Engineering. BS, Clemson University, 1959; DSc, University of Virginia, 1963
- Barron, Felix Hector**, Assistant Professor of Food Science and Packaging Science. BS, University of Chiuhua (Mexico) 1972; MS, University of Rome (Italy) 1975; MS, Washington State University, 1982; PhD, Michigan State University, 1990
- Bartley, Marlin Collins III**, Instructor of English. BS, University of Alabama, 1985; MFA, Wichita State University, 1990

- Bates, William G.**, *Biomedical Professor; Vice President of Medical Education and Research, Greenville Hospital System*. BS, 1962, MD, 1965, University of North Carolina
- Bauer, Larry Lee**, *Professor of Agricultural and Applied Economics*. BS, University of Illinois, 1961; MS, Purdue University, 1963; PhD, North Carolina State University, 1968
- Bauer, Philip**, *Adjunct Assistant Professor of Agronomy*. BS, 1979, BS, 1982, MS, 1985, University of Wisconsin; PhD, Texas A&M University, 1988
- Bauer, Richard Charles II**, *Visiting Assistant Professor in Chemistry*. BS, Saginaw Valley State University, 1985; MS, 1992, PhD, 1994, Purdue University
- Baum, Carl William**, *Assistant Professor of Electrical and Computer Engineering*. BS, University of California, 1987; MS, 1989, PhD, 1992 University of Illinois
- Bautista, Gloria**, *Associate Professor of Spanish*. BA, Javeriana University (Colombia), 1972; MA, 1975, PhD, 1987, State University of New York
- Baxa, Ernest Granville, Jr.**, *Associate Professor of Electrical and Computer Engineering*. BEE, University of Virginia, 1962; MSEE, 1968, PhD, 1970, Duke University
- Beard, John Nelson, Jr.**, *Professor of Chemical Engineering*. BS, University of South Carolina, 1958; MS, 1970, PhD, 1971, Louisiana State University
- Beasley, Donald Erwin**, *Professor of Mechanical Engineering*. BS, 1978, MS, 1980, Clemson University; PhD, University of Michigan, 1983
- Beattie, Robert J.**, *Biomedical Professor; Director, Animal Resource Facility, University of South Carolina*. BS, 1962, DVM, 1964, Kansas State University
- Bechtel, Deborah Ann**, *Assistant Professor in School of Nursing*. BSN, Radford University, 1982; MS, University of Delaware, 1985; PhD, University of Texas, 1993
- Becker, Robert Henry**, *Director of Strom Thurmond Institute; Professor of Parks, Recreation and Tourism Management*. BS, Pennsylvania State University, 1970; MA, 1977, PhD, 1976, University of Maryland
- Beckerle, John David**, *Assistant Professor of Physical Chemistry in Chemistry*. BS, McGill University, 1981; PhD, Massachusetts Institute of Technology, 1988
- Beckwith, William Frederick**, *Director of General Engineering and Professor of Chemical Engineering*. BS, 1957, MS, 1961, PhD, 1963, Iowa State University; PE
- Bednar, John Clay**, *Associate Professor of French*. BA, Princeton University, 1965; PhD, University of Besancon (France), 1969
- Behery, Hassan Mohamad**, *Professor of Textiles*. BS, 1950, MS, 1955, Alexandria University; PhD, University of Manchester, 1959; CText; FTI
- Belcher, Cynthia Leahy**, *Assistant Professor in School of Nursing*. BSN, University of Miami, 1969; MN, Emory University, 1971
- Bell, Lansford Charles, S. E.**, *Liles Distinguished Professor of Construction Engineering*. BS, 1965, MS, 1968, University of Maryland; PhD, Vanderbilt University, 1972; PE
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- Waller, Robert Alfred**, *Professor of History*. BA, Lake Forest College, 1953; MA, 1958, PhD, 1963, University of Illinois
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COURSE ABBREVIATIONS

A A H	Art and Architectural History	GEOL	Geology
A A S	African American Studies	GER	German
A S	Aerospace Studies	H ADM	Hospital Administration
ACCT	Accounting	H R D	Human Resource Development
ADVSC	Animal, Dairy and Veterinary Science	HIST	History
AG E	Agricultural Engineering	HLTH	Health
AG ED	Agricultural Education	HORT	Horticulture
AG M	Agricultural Mechanization	HUM	Humanities
AGRIC	Agriculture	I E	Industrial Engineering
AGRON	Agronomy	I P M	Integrated Pest Management
AN PH	Animal Physiology	IN ED	Industrial Education
ANTH	Anthropology	ITAL	Italian
AP EC	Agricultural and Applied Economics	JAPN	Japanese
ARCH	Architecture	L S	Leisure Skills
ART	Art	L&IT	Language and International Trade
ASTR	Astronomy	LANG	Language
BIO E	Bioengineering	LARCH	Landscape Architecture
BIOCH	Biochemistry	LATIN	Latin
BIOL	Biology	LAW	Legal Studies
BIO SC	Biological Sciences	M B A	Business Administration
BOT	Botany	M E	Mechanical Engineering
C & I	Commerce and Industry	M H A	Master of Health Administration
C E	Civil Engineering	M S	Military Science
C ED	Coaching Education	M T	Medical Technology
C H S	Calhoun Honors Seminar	MA SC	Management Science
C R D	Community and Rural Development	MAT E	Materials Engineering
C R P	Planning Studies	MGT	Management
C S M	Construction Science and Management	MICRO	Microbiology
CH	Chemistry	MKT	Marketing
CH E	Chemical Engineering	MTHSC	Mathematical Sciences
CP SC	Computer Science	MUSIC	Music
CR E	Ceramic Engineering	NURS	Nursing
DSIGN	Design Studies	NUTR	Nutrition
E C E	Electrical and Computer Engineering	P S	Poultry Science
E G	Engineering Graphics	PH SC	Physical Science
E M	Engineering Mechanics	PHIL	Philosophy
E S E	Environmental Systems Engineering	PHYS	Physics
ECON	Economics	PKGSC	Packaging Science
ED	Education: Curriculum and Instruction	PL PA	Plant Pathology
ED C	Education Counseling	PL PH	Plant Physiology
ED F	Educational Foundations	PO SC	Political Science
ED SP	Special Education	PRTM	Parks, Recreation and Tourism Management
EN SP	Environmental Science and Policy	PSYCH	Psychology
ENGL	English	R S	Rural Sociology
ENGR	Engineering	REL	Religion
ENT	Entomology	RUSS	Russian
ENTOX	Environmental Toxicology	SOC	Sociology
EX ST	Experimental Statistics	SPAN	Spanish
F&RR	Forest and Recreation Resources	SPCH	Speech
FD SC	Food Science	T C	Textile Chemistry
FD TH	Food Technology	TEXT	Textile Management and Textile Science
FIN	Finance	THEA	Theatre
FOR	Forest Resources	THRD	Technology and Human Resource Development
FR	French	VT ED	Vocational-Technical Education
G C	Graphic Communications	W F B	Wildlife and Fisheries Biology
G S	Graduate Studies	W S	Women's Studies
GEN	Genetics	ZOOL	Zoology
GEOG	Geography		

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